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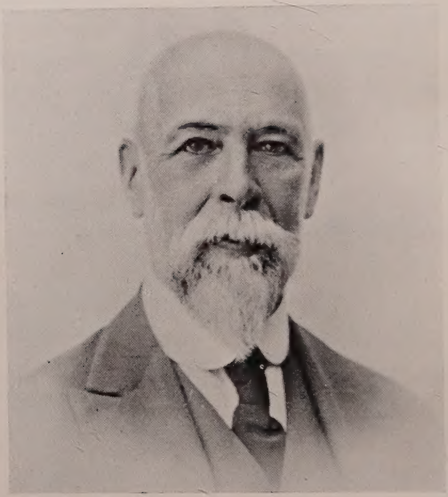

Dr J. W. C. GOETHART

21. Juli 1866—3. Februar 1938.

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Dr JAN WILLEM CHRISTIAAN GOETHART

21. Juli 1866—3. Februar 1938 [1])

von

W. A. GODDIJN

(Leiden).

Am 3. Februar dieses Jahres verschied Dr J. W. C. GOETHART, der von 1910 bis 1932 Direktor des Reichsherbariums und Lektor der systematischen Botanik an der Reichsuniversität zu Leiden war.

Dr GOETHART wurde geboren am 21. Juli 1866 zu Semarang in Niederländisch-Indien. Er studierte in Wageningen an der Landwirtschaftlichen Hochschule und beendete seine biologischen Studien an der Universität zu Göttingen unter Leitung bekannter Gelehrter wie Prof. H. GRAF ZU SOLMS—LAUBACH, Prof. G. BERTHOLD, Prof. G. EHLERS u. a. Seine Untersuchungen über Malvaceenblüten wurden bearbeitet in einer Inaugural-Dissertation, und 1890 promovierte der junge GOETHART "*summa cum laude*" mit seinen "Beiträgen zur Kenntnis des Malvaceen-Andröceums" an der Georg-August-Universität.

Zunächst war Dr GOETHART Assistent bei Prof. HUGO DE VRIES in Amsterdam. Einige Jahre verbrachte er an einer jetzt schon längst aufgehobenen landwirtschaftlichen Versuchs-Station zu Hoorn. In 1897 wurde er zum Conservator (Kustos) beim Reichsherbarium zu Leiden ernannt, als Nachfolger von Dr BOERLAGE. Damals war Prof. W. F. R. SURINGAR Direktor, der bald darauf starb und ersetzt wurde durch Prof. J. M. JANSE. Der Einfluss Dr GOETHARTS auf das Schicksal des Reichsherbariums begann aber erst im Jahre 1906, als sein Jugendfreund und Studiengenosse, Dr J. P. LOTSY, der Lektor der systematischen Botanik an der Leidener Universität war, auch mit der Leitung des Reichsherbariums beauftragt wurde. In einer vierjährigen Zusammenarbeit haben die beiden Freunde die grösste Reorganisation des Herbariums vorgenommen, welche das Institut je gekannt hat. Sie lebten in der Hoffnung, das Reichsherbarium zu einem grossen zentralen Institut machen zu können, wo nicht nur die Systematik in der üblichen Weise getrieben werde sollte, sondern wo das Wesen und die Begrenzung der Arten auch mit experimentellen Methoden erforscht werden sollten. Diese Aussicht änderte sich 1910, als die Pläne Dr LOTSY's im Parlament scheiterten, und Dr GOETHART allein blieb, den immer mühsamer werdenden Weg weiter zu gehen.

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[1]) Der Herausgeber d. Zeitschr. und der Verfasser dieses Nekrologes möchten an dieser Stelle Herrn Prof. Dr L. DIELS zu Berlin für das Durchsehen des Manuskriptes und des Korrekturbogens freundlichst danken.

Der derzeitige Direktor des Reichsherbariums und Herausgeber dieser Zeitschrift hat mich gebeten, mit einigen Worten des verewigten ehemaligen Direktors in dieser Zeitschrift zu gedenken. Als früherer Conservator und Mitarbeiter Dr GOETHARTS, fällt es mir nicht leicht, in knapper Fassung seine Persönlichkeit und seine Auffassungen in objektiver Weise darzustellen. Ich habe grosse Achtung und Verehrung für diesen wahrhaft guten, ehrlichen und uneigennützigen Menschen gehabt. In den vielen Jahren gemeinschaftlicher Arbeit war er für mich mehr ein Freund, als ein Vorgesetzter. Ich möchte nichts anderes als Lob für ihn haben. Und doch habe ich ihn, namentlich in den letzten Jahren seines Direktorates, fast immer betrachten müssen als eine tragische Figur, die innerlich Konflikte erlebte, aber immer wieder als Mann kämpfend mit Aufrichtigkeit und Ueberzeugung für seine Ideale eintrat. Kennzeichnend für die letzten Jahre seines Direktorates war ein stets lebhafter werdendes Streben nach einem Staats-Institut, das sich unabhängig von dem Unterricht und der Universität entwickeln dürfte. Seine letzte Schrift war eine öffentliche Verteidigung dieser Gedanken. Als er 1932 wegen seines 65-jährigen Alters seine Entlassung nehmen musste, stand er allein.

Wie man auch GOETHARTS Gedanken und Ansichten über Ziel und Bestimmung eines Reichsherbariums einschätzen mag, verurteilen darf man ihn ohne weiteres nicht! Man hat dabei zu berücksichtigen, dass Dr GOETHARTS Direktorat nicht als eine gesonderte Periode in der Geschichte des Reichsherbariums zu deuten ist, sondern betrachtet werden muss als eine Fortsetzung der von LOTSY und GOETHART zusammen geplanten, aber nur teilweise zur Ausführung gelangten Reorganisation des Institutes. Dr GOETHART lebte, wenigstens im Anfang seines Direktorates, in der Ueberzeugung, dass er auf genügende Unterstützung der Behörden rechnen dürfte, um in der geplanten Richtung weiter arbeiten zu können. Namentlich die Folgen der gescheiterten Pläne LOTSY's sind es, welche Dr GOETHARTS Leitung zu einem fortwährenden Kampf mit den Behörden der Universität gemacht haben. Dabei empfand er seine Unterrichtsverpflichtung, die er doch sehr liebte, als eine Hemmung seiner Tätigkeit als Direktor. Auch über die Art und Weise des systematischen Unterrichtes gab es Unstimmigkeiten. Allerdings waren diese Umstände wenig geeignet, fruchtbare Arbeit und das Wohl des Institutes zu fördern. Aber eines, und zwar wichtiges, verdankt das Reichsherbarium seinem verewigten ehemaligen Direktor, nämlich: eine gut geordnete, völlig montierte, wohlversorgte Sammlung, die der wissenschaftlichen Bearbeitung zugänglich geworden ist. Statt der früheren grösseren und kleineren Sammlungen verschiedener Art, gibt es jetzt nur noch eine Sammlung des gesamten Materials und dabei eine Hilfsapparatur von GOETHARTS eigener Erfindung, die die unversehrte Aufbewahrung des wertvollen Typenmaterials verbürgt. Ich erwähne hier an erster Stelle die Methode der Aufbewahrung des Materials in Pappschachteln (die sich jetzt nach 25 Jahren völlig bewährt hat), und dazu die Desinfektionskasten, welche einen ständigen Schutz gegen Insektenfrass mittels Tetrachlorkohlenstoff ermöglichen, die Vorrichtung zum Trocknen frischen Materials, die Verbesserungen des photographischen Apparates für schattenfreie Aufnahmen des Typenmaterials, u.s.w. Der Mangel an Tauschmaterial gab Anlass, nach neuen Verbindungen mit Instituten im Ausland zu suchen. So errichtete GOETHART schon im ersten Jahre seines Direktorats eine eigene Zeitschrift für das Institut: "Mededeelingen van 's Rijks Herbarium", worin die Resultate systematischer Studien an Material des Reichsherbariums zur Publikation gelangen konnten. Diese hatte eine beträchtliche Bereicherung der Bücher- und Zeitschriftensammlung zu Folge. In dieser Reihe von Veröffentlichungen, deren Anzahl zwischen 1910 und 1933 70 Nummern betrug, findet man grundlegende Arbeiten von HENRARD (Aristida-Monographie), H. HALLIER (Elbert-Exp., u.s.w.), JONGMANS (Paläobotanik), VALCKENIER SURINGAR (Nomenklatur), VAN DEN BOSCH (Hymenophyllaceae), Dr HERZOG's Bolivien-Reisen, eine Gedächtnisausgabe zum Hundertjährigen Bestehen des Institutes, u.s.w.

Auch in anderer Weise suchte GOETHART das Herbarium in verschiedener Richtung zu bereichern und praktischen Zwecken zu dienen. So wurde eine paläobotanische Abteilung errichtet, mit deren Leitung Dr W. J. JONGMANS beauftragt wurde. Die Mykologie wurde hinzugezogen, als der Niederländische Mycologische Verein sein Material dem Reichsherbarium zur Verfügung stellte. Auch das Herbar des Niederländischen Botanischen Vereins fand Unterkunft im neuen Gebäude, das 1912 bezogen wurde.

Von seinen persönlichen Arbeiten erwähne ich die Pflanzenkärtchen der Niederlande in Zusammenarbeit mit Dr JONGMANS. Er beabsichtigte damit die geographische Verbreitung der Arten unserer Flora bildlich darzustellen. Diese Riesenarbeit wurde später vom I. V. O. N. (Institut für Vegetationsforschung in den Niederlanden) übernommen. Selber widmete er sich der experimentellen Systematik, d.h. er versuchte mittels Kulturversuchen und Kreuzungen die durch die Natur gegebenen Grenze der Arten ausfindig zu machen. Solche Versuche erfordern aber eine grosse Anzahl Mitarbeiter, oder vielleicht besser noch (wie er selber sagte) ein ganzes Institut, um die Tatsachen aufzeichnen zu können und die Versuche nötigenfalls Jahrzehnte lang durchzuführen, um die Aenderung der Arten festzustellen. Man sieht hieraus, wie weit sein Blick reichte, wenn er eine Arbeit unternahm. Man kann nur bedauern, dass die Resultate seiner Versuche, die er fast ausschliesslich aus eigenen Mitteln bezahlte und an denen bisweilen auch Studenten sich beteiligten, nicht publiziert worden sind.

Dr GOETHART war ein Idealist. Alle, die ihn persönlich gekannt haben, sei es als Freund, sei es als Gegner, werden darüber einig sein. Dem Zauber seines liebenwürdigen Charakters und seines gebildeten Geistes entging wohl niemand. Wenn Dr GOETHART den Kampf für seine Ideale verloren hat, so wird doch die Zukunft beweisen, dass das Reichsherbarium, obwohl in den Kreis der Universitäts-Interessen einbezogen, jetzt sich hauptsächlich auf das Studium der Niederländisch-Indischen Flora und auf Probleme der Phylogenie und Geographie richtend, doch durch seine Geschichte, die Art und den Umfang seines Materials (Typensammlung!) ein unabhängiges Institut bleiben wird. Es ist hart, ein ganzes Leben lang für seine Ideale gestritten zu haben, ohne sichtbare Erfolge zu erzielen. Lasst uns das Gedächtnis Dr GOETHARTS ehren!

THE NETHERLANDS' CHARAOPHYTA

by

H. D. VERDAM

(Leiden).

The *Charophyta* of the Netherlands have been hitherto almost neglected. As far as I know only the following papers are dealing with the matter:

Van den Bosch, R. B., in Ned. Kruidk. Archief I, 1846, p. 100, p. 289.
” ” ” , ” ”, ” ” ” ” II, 1851, p. 225.
both preliminary works to
Prodromus Florae Batavae II, 2, 1853, p. 186—189.
De Vries, H., Flora van Nederland, in Alg. Statist. v. Ned. I, 8, 1870, p. 39.

A few *Charophyta* from the IJselmeer have been recorded lately:
Hocke Hoogenboom, K. J., in Ned. Kruidk. Archief XVLII, 1937, p. 315—316, p. 327.

In the present paper a list is given of the *Charophyta* collected up to this time in the Netherlands and preserved in the National Herbarium at Leiden (L), the herbarium of the "Nederlandsche Botanische Vereeniging" at Leiden (B) and those of the Universities of Amsterdam (A), Utrecht (U), Groningen (G) and the material of the "Commissie voor onderzoek van het Naardermeer" (N). It is a pleasure to me to express my best thanks to Prof. H. J. Lam for putting the material at my disposal, to the directors of the Institutes mentioned above and to the staff of the Rijksherbarium, Leiden, particularly to Miss Dr. J. Th. Koster, who has given me much valuable help. Though it is not my intention to dwell upon a detailed explanation about development, growth, phylogeny, history, etc., some remarks have to be made. The principal literature on these subjects is:

Groves, J. & Bullock—Webster, G. R., The British Charophyta I, 1920, II, 1924. (Groves)

Hy, F., Les Characées de France — Mém. Soc. Bot. de France 3, mém. 26, 1914, p. 1. (Hy)

Rabenhorst, L., Kryptogamen Flora von Deutschland, Oesterreich und der Schweiz V, 1890—1897 (Migula, W.). (Mig.)

Robinson, C. B., The Chareae of North America — Bull. New York Bot. Gard. IV, 1905—1907, p. 244. (Rob.)

In general, the subdivision by Migula into many forms is considered to be too detailed, as his constant forms may as well be inconstant local forms of one and the same species. However, since I found in the Quackjeswater (a pool) at Voorne near Rockanje nine very well distinguishable forms of *Chara aspera* as described by Migula, mixed up with each other, I am convinced that in general he must be right. Afterwards I found in the Herbarium of the "Botanische Vereeniging" a sheet from one place in the island of Texel (Holkema 1868) containing three of the forms collected in the Quackjeswater. These two series have grown respectively under the same conditions and the three forms show the same distinct characters in both habitats. I therefore chiefly followed the subdivision proposed by Migula and identified the material as far as I was sure to have the same forms as were described by him. When there was hardly any doubt, the expression: acc. ad (= accedens ad) precedes the name and when I was not sure about the form, only the specific name was given. For comparison principally the rich *Charophyta* collection of the Leiden National Herbarium was used, which for the greater part has been revised by A. Braun. As is known the herbarium Kützing has been added to this collection, containing the principal Exsiccata collections. Moreover, specimens distributed by W. Migula, belonging to the Herbarium of the Utrecht University, have been investigated. Braun and Kützing have examined and commented many specimens of the material from the Netherlands. In such cases their opinions about the specimens are separately added. In naming the species generally Robinson was followed. Only few synonyms are cited, since complete lists of these are to be found in the works of Groves and Migula. As a rule, generic and specific characters used in the keys have not been repeated in the short descriptions of the species.

Key to the genera

Cells of coronula in two rows, each of five cells; cortex and stipulodes wanting . . **Subfamily Nitelleae**

Leaves once or more times furcated, antheridia terminal on the primary ray and secondary rays of the leaf . . . . **I. Nitella**

Leaves not furcate or furcate so that the mean ray is much more developed than the other one, antheridia lateral on the nodes of the leaf or at the base of the whorl . . . . **II. Tolypella**

Cells of coronula in a single row of five cells . . . Subfamily Chareae
Stipulodes none, ecorticate, dioecious . . . . **III. Nitellopsis**
Stipulodes present, sometimes reduced.
Oogonia below the antheridia, ecorticate, monoecious. **IV. Lamprothamnus** (not found in the Netherlands)
Oogonia between the antheridia, corticate or ecorticate, monoecious . . . . **V. Lychnothamnus** (not found in the Netherlands)
Dioecious or monoecious. If monoeicious, oogonia above the antheridia; if dioecious, oogonia on the upperside of a leaf-segment, corticate or ecorticate. **VI. Chara**

I. NITELLA Agardh

Key to the species

Leaves once furcate, ultimate rays 1-celled, coronula deciduous.
Antheridia and oogonia enveloped in mucus.
Feminine leaves not furcate, oospore smooth, tip of leaf pointed . . . **1. N. syncarpa**
Feminine leaves furcate, oospore oxygyrous, tip of leaf obtuse . . . . **2. N. capillaris**
Antheridia and oogonia not enveloped in mucus.
Dioecious . . . . **3. N. opaca**
Monoecious . . . . **4. N. flexilis**
Leaves once furcate, equal in each whorl, ultimate rays 2—3-celled, coronula persistent. Ultimate rays short, secondary rays usually minute and inconspicuous. Fertile leaves incurved and crowded . . . . **5. N. translucens**
Leaves in each whorl of two kinds, smaller accessory leaves being produced above and below the primary leaves, together forming heads. **6. N. hyalina**

1. **Nitella syncarpa** (THUILL.) KG. Phyc. germ., 1845, p. 256 — *Chara syncarpa* THUILL. Flore de Paris ed. II, 1799, p. 473.

Lit.: KG. Spec. Alg., 1849, p. 514; Prod. Fl. Bat. II, 2, 1853, p. 188; MIG. l. c. p. 98; HY l. c. p. 8 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 13, T. 31, fig. II; MIG. l. c. Fig. 28.

Dioecious, 10—20 cm high. Thin, slender and flexible species. Stem thin and often dirty brownish green. Leaves about 6 in a whorl, often two accessory ones, only once bifurcate. Ultimate segments 1-celled, the sterile and male ones 2—4-pointed, the feminine ones usually 1-pointed. The second segment of the leaves of the lower whorl often wanting, in that case oogonia terminal. Cell wall of the leaflets rather thin, hyaline and thickened at the top. Top of the leaflet pointed.

Oogonia 2—3 together, 280—500μ ($\pm$ 350 μ) long. Antheridia single, 250—325 μ ($\pm$ 290 μ) in diam.

Distribution: Europe.

Formae dissolutae

Lit.: MIG. l.c. p. 105.

No heads are formed by the whorls of the leaves.

Groningen: Groningen outside Apoort (B) — Utrecht: Utrecht outside Waardpoort, VAN DER TRAPPEN (B); BERGSMA (B, L, KÜTZING: *Nitella syncarpa*); ex herb. NIJLAND, IV 1843 (B); GEVERS DEYNOOT n. 386 (B), acc. ad Nitellam syncarpam — N. Brabant: Beugen, peat, Unio VII, 1853 (B) — Gelderland: LACOSTE n. 573 (B, L, BRAUN could decide nor to *Nitella capitata* nor to *Nitella syncarpa* by examining only these male specimens, KÜTZING: *Nitella syncarpa*); LACOSTE n. 1080 (B) — N. Holland: Amsterdam, LACOSTE n. 573 (L, KÜTZING: *Nitella syncarpa*).

2. **Nitella capillaris** (KROCKER) GROVES Brit. Char. I, 1920, p. 26 — *Chara capillaris* KROCKER Fl. Siles. III, 1814, p. 62 — *Chara capitata* NEES AB ESENBECK in Denkschr. Bayr. bot. Ges. II, 1818, t. 6, p. 80 — *Nitella capitata* AG. Syst. Alg., 1824, p. 125.

Lit.: MIG. l.c. p. 111; HY l.c. p. 7; GROVES I l.c. p. 96 — *Ill.:* MIG. l.c. Fig. 31; HY l.c. Pl. I, fig. 5, 6; GROVES I l.c. Pl. VI.

Dioecious, 10—15 cm high. Usually 1—4 stems (internode of ± 3 cm), furcating when starting from the soil, forming a tuft. Stem slender, bright pale green. Internodes 1—1½ time as long as the leaves. Leaves once furcate. Fertile whorls usually with short leaves forming dense heads. Primary and secondary rays of equal length. Secondary rays 2—4-celled. Oogonia usually 2—3 together, 400—500 μ (± 450 μ) long. Oospore chestnut brown. Antheridium 225 μ in diam.

Distribution: Europe, N. Africa, Asia and N. America.

Groningen: Esserweg, ditch, POSTMA 22 IV 1906 (G) — Drente: Assen, pond in the wood, V 1855 (B); Roden—Peize, Zetdiep, 27 V 1855 (B) — Utrecht: Oudwijk near Utrecht, Broers (A) — S. Holland: Boekhorst, pool, 1858 (B).

3. **Nitella opaca** AG. Syst. Alg. 1824, p. 124.

Lit.: MIG. l.c. p. 121; HY l.c. p. 9; GROVES I l.c. p. 99. — *Ill.:* MIG. l.c. Fig. 35; HY l.c. Pl. I, fig. 3; GROVES I l.c. Pl. VII.

Dioecious, 15—25 cm high. Stem moderately stout. Internodes 2—4 times as long as the leaves. Leaves once furcate forming more or less dense heads. Secondary rays 1-celled about $^1/_3$ as long as the primary one. Oogonia solitary or geminate 580—700 μ (± 600 μ) long. Oospore dark chestnut brown to black. Antheridia 650—775 μ in diam. (fide GROVES). Can be confounded with *Nitella flexilis*, however, different habitus and antheridia of *N. opaca* larger than those of *N. flexilis* (± 500 μ in diam.).

Distribution: Europe, N. Africa, Asia, N. & S. America.

Gelderland: Staverden, Hierderbeek (brook), LACOSTE VII 1855 (L, sterile, BRAUN: *Nitella opaca*) — N. Holland: Naardermeer, POLAK & BUISMAN 13 V 1924 (N), only feminine specimens — Zeeland: Goes, in pools, VAN DEN BOSCH IV 1843 (B, sterile).

4. **Nitella flexilis** (L.) AG. Syst. Alg. 1824, p. 124 — *Chara flexilis* L. Sp. Plant. 1753 ex parte, p. 1157.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 188; MIG. l.c. p. 132; HY l.c. p. 10; GROVES I l.c. p. 102; LAKOWITZ, Algenfl. Ostsee 1929, p. 194 — *Ill.:* MIG. l.c. Fig. 37; HY l.c. Pl. I, fig. 2; GROVES I l.c. Pl. VIII.

Monoecious, about 15—30 cm high. Plants forming individual tufts, 10—20 stems grown together starting from the base, brightly deep-green. Stem moderately stout to flexible. Internodes 1½ time as long as the leaves. Whorls consisting of 6—8 straight leaves, fertile ones similar to sterile ones. Leaves once furcate. Primary rays about twice as long as the secondary ones. Secondary rays 2—3, acuminate or slightly mucronate. Oogonia 2—3 together 490—525 μ ($\pm$ 500 μ) long. Oospore dark reddish brown. Antheridia 240—325 μ ($\pm$ 300 μ) in diam.

To be distinguished from *N. opaca* by the more graceful habitus and the smaller antheridia.

Distribution: Europe, Asia (Kamchatka and Japan), N. & S. America.

Drente: Roden—Peize, canal, 27 V 1855 (B) — Gelderland: Emst near Epe, peatmoor, KOK ANKERSMIT 5 VII 1875 (B); Uddelermeer (lake), LACOSTE 1849 (L, BRAUN: *Nitella flexilis?*); pool, LACOSTE 1849 (B, BRAUN: *Nitella syncarpa* junior flexilis); Vaassen—Apeldoorn, canal, LACOSTE 3 VIII 1854 (L, sterile, BRAUN: *Nitella flexilis,* sed propter sterilitatem incerta); Apeldoorn, Grift, brooklet, LACOSTE VIII 1854 (L, sterile, BRAUN: *Nitella flexilis*) — Utrecht: de Bilt, BONDAM (L); Vinkeveen, LACOSTE 1850 (L, BRAUN: *Nitella flexilis*), LACOSTE V 1850 (B, BRAUN: *Chara flexilis* vera); Achttienhoven, in a boggy pool, LACOSTE 1841 (B); Utrecht—Westbroek, river Vecht, OUDEMANS n. 635, 24 V 1871 (L, U, A, G) — N. Holland: Heemstede (L, KÜTZING: *Nitella exilis* BRAUN); VAN DER TRAPPEN (B, sterile) — Zeeland: Near Goes, in ditches, VAN DEN BOSCH (L) — N. Brabant: Heusden, river Oud Maasje, LACOSTE VIII 1847 (L, KÜTZING: *Nitella flexilis?*); Vught, pond, Muizerik, VAN HOVEN (B) — Limburg: Weert, VERSTRAETEN 27 VII 1905 (G), sterile, acc. ad *Nitellam flexilem;* near Maastricht, FRANQUINET (L, BRAUN: *Nitella flexilis*).

5. **Nitella translucens** (PERS.) AG. Syst. Alg. 1824, p. 124 — *Chara translucens* PERS. Synopsis II, 1807, p. 531.

Lit.: Prod. Fl. Bat. II, 2, p. 188; MIG. l.c. p. 140; HY l.c. p. 11; GROVES I l.c. p. 110 — *Ill.:* MIG. l.c. Fig. 39, 40; HY l.c. Pl. I, fig. 9, 19; GROVES I l.c. Pl. XI.

Monoecious. Habitus of sterile plants at first sight resembling that of *Nitellopsis obtusa*, but plant shorter (to 30 cm). Stem stout. Internodes 1½—3 times as long as the leaves. Sterile leaves 4—7, once furcate, primary rays very long, secondary ones minute; fertile leaves in small whorls, closely together, often forming dense heads (fide GROVES). Ultimate rays of the branchlets 2-celled. Oogonia 2—3 together, 475—525 μ long (fide GROVES). Antheridia 250—375 μ in diam. (fide GROVES).

Distribution: W. Europe, N. Africa (Algiers).

N. Brabant: Vught, pits in moorland, LACOSTE? IX 1847 (L); moorland, VAN HOVEN 1903 (L).

6. **Nitella hyalina** (DC.) AG. Syst. Alg. 1824, p. 126, ex parte — *Chara hyalina* DC. Fl. Fr. V, 1815, p. 247, ex parte.

Lit.: MIG. l.c. p. 190; HY l.c. p. 19; GROVES I l.c. p. 127 — *Ill.:* MIG. l.c. Fig. 55, 56; HY l.c. Pl. I, fig. 15; GROVES I l.c. Pl. XVI.

Monoecious. Stem slender. Internodes 2—4 times as long as the leaves. Whorls of usually 8 primary leaves with twice as many shorter secondary ones in two rows; one above, the other below the primary leaves. Leaves together forming heads somewhat stringed at ¼ of the height from below. Primary leaves 2—3 times furcate, secondary leaves of the lower series 1—2 times furcate into 4—6 rays, those of the upper rays usually once furcate into about 5 rays, or simple. Oogonia solitary 500—625 μ long. Antheridia 350—425 μ in diam. (fide GROVES).

Distribution: W. Europe, Finland, S. Asia, Japan, N. & S. Africa, N. America, Australasia.

Friesland: Drachten, Oudgaasterzanding, GEERTS & RONNER 15 VIII 1905 (A), sterile.

f. β **maxima** A. BR.

Lit.: MIG. l.c. p. 196 — *Ill.:* MIG. l.c. Fig. 57.

Stem flexible, ± 30 cm long with large heads (2—4 cm in diam.). Leaves often three times furcate to 2 cm long, internodes to 5 cm.

Friesland: Veenwouden, "sanjes", 23 VII 1854 (B).

II. TOLYPELLA v. LEONHARDI

Key to the species

Ultimate cell of the rays conical.
  Sterile leaves furcate . . . . 1. **T. intricata**

Sterile leaves simple . . . . 2. **T. prolifera**
Ultimate cell of the rays allantoid.
Sterile leaves simple. Ripe oospore small . . . . 3. **T. glomerata**

1. **Tolypella intricata** (TRENTEP.) v. LEONHARDI in Lotos 1863, p. 32 — *Chara intricata* TRENTEPOHL apud Roth Catalecta botanica Fasc. 1, 1797, p. 125.

Lit.: MIG. l.c. p. 214; HY l.c. p. 21; GROVES I l.c. p. 130 — *Ill.:* MIG. l.c. Fig. 61; GROVES I l.c. Pl. XVII.

Monoecious, 15—25 cm high. Stem moderately stout, often much branched. Whorls of two kinds: the sterile and lower fertile ones distant, large and lax, the sterile usually once, the fertile once or twice divided with a variable (often considerable) number of shorter, more slender, usually simple, accessory leaves; the upper fertile whorls forming very large dense heads, with shorter, usually twice divided leaves. Ultimate rays of the leaves 5—7-celled, the cells successively diminishing in length and thickness, so that the ray tapers to the apex. Oogonia 2—4 together at each node, about 300—375 μ (± 350 μ) long. Antheridia 250 μ in diam.

To be distinguished from *T. prolifera* by the size and the divided sterile leaves.

Distribution: W. Europe, N. Africa (Algiers).

Groningen: near Groningen, HOEDEMAKER (G); Zuidlaren, ditches, STRATINGH V 1860 (G) — Gelderland: Lochem, running water near "de Luchte", 21 IV 1860 (B) — Utrecht: Vleuten, GEVERS DEYNOOT IV 1843 (L, KÜTZING: *Nitella polysperma* BRAUN); GEVERS DEYNOOT, herb. LACOSTE (L, BRAUN: *Nitella (Tolypella) intricata, Chara intricata* ROTH *Ch. fasciculata* AMICI, *Ch. polysperma* A. BRAUN olim) — Zeeland: Goes, in ditches, VAN DEN BOSCH n. 120 (L, KÜTZING: *Chara intricata*).

2. **Tolypella prolifera** (A. BR.) v. LEONHARDI in Lotos 1863, p. 57, Oesterr. Arml., 1864, p. 57 — *Chara prolifera* A. BR. in Ann. Sc. Nat. Sér. 2, I, 1834, p. 352.

Lit.: Prod. Fl. Bat. II, 2, p. 189; MIG. l.c. p. 203; HY l.c. p. 22; GROVES I l.c. p. 133. — *Ill.:* MIG. l.c. Fig. 59, 60; GROVES I l.c. Pl. XVIII.

Monoecious. Most robust species of this genus (30—40 cm high). Stem very stout, often solitary, much branched. Sterile whorls of about 6—20 simple 3—5-celled leaves, often very unequal, the cells diminishing gradually in length and thickness towards the apex, apical cell rather bluntly conical. Fertile whorls usually in large densely crowded heads. Ultimate rays of the leaves 3—5-celled, the cells usually much diminishing in length and breadth towards the apex; ultimate cells conical, acute or acuminate, sometimes rather blunt. Oogonia 250—270 μ (± 250 μ) long. Antheridia 190—225 μ (± 200 μ) in diam.

To be distinguished from *T. glomerata* chiefly by the much more robust habitus.

Distribution: W. Europe, N. & S. America.

Groningen: near Groningen, VAN HALL (B) — S. Holland: Dordrecht—Willemsdorp, ditch, ALPHERTS & VAN HOVEN IX 1848 (L); near Dordrecht?, VAN HOVEN IX 1848 (B, probably belonging to the preceding specimen; BRAUN: *Nitella prolifera* KG.) — N. Brabant: Zevenbergen—Roodevaart, LACOSTE 23 VII 1860 (B).

3. **Tolypella glomerata** (DESVAUX) v. LEONHARDI in Lotos 1863, p. 129 — *Chara glomerata* DESVAUX in Lois. Not. Fl. Fr. 1810, p. 135.

Lit.: MIG. l.c. p. 227; HY l.c. p. 20; GROVES I l.c. p. 135 — *Ill.:* MIG. l.c. Fig. 64; GROVES I l.c. Pl. XIX.

Monoecious, 20—25 cm high. Resembles *T. prolifera* but smaller and more slender and sterile leaves not divided. Stem slender to moderately stout. Sterile whorls consisting of 6—12 elongated simple 3—5-celled leaves, the ultimate cell obtuse. Fertile whorls in dense compound heads of once furcate leaves, ultimate cells obtuse. Oogonia 2—6 together 325—400 μ (± 370 μ) long. Antheridia 220—260 μ (± 250 μ) in diam.

Distribution: W. Europe, N. Africa, W. Asia, Australasia.

Groningen: Groningen, ditch outside Apoort, STRATINGH (G), VAN HALL (B).

f. **tenuior** A. BR. in MIG. l.c. p. 232.

Plants about 6 cm high, very slender, grass-like. Internodes to 2 cm long. Leaves of the sterile whorls very long, usually as long as the whole plant (4—5 cm). Heads small, 2—4 mm in diam. Usually 5—6 normal and about 10—12 accessory leaves in one fertile head; inner whorl with some very long leaves (15—20 mm).

Friesland: Takozijl, pier near sluice, VAN DER WERFF n. 42 B, 26 VI 1935 (L); between Kornwerderzand and coast of Friesland, HOCKE HOOGENBOOM n. 146 (29), 3 VII 1934 (B, "Tolypella nidifica" in Ned. Kruidk. Arch. XLVII, 1937, p. 315).

III. NITELLOPSIS HY

Only species:

Nitellopsis obtusa (DESVAUX) J. GROVES in Journ. Bot. 52, 1919, p. 127 — *Chara obtusa* DESVAUX in Lois. Not. Fl. Fr. 1810, p. 136 — *Tolypellopsis stelligera* (BAUER) MIG. l.c. p. 255.

Lit.: HY l.c. p. 22; GROVES II l.c. p. 3 — *Ill.:* MIG. l.c. Fig. 70, 71, 72; GROVES II l.c. Pl. XIV.

Dioecious. Tall specimen, to 75 cm high. Stem stout, producing at the lowest nodes rhizoid-like branches, bearing large white much thickened starshaped nodes. Internodes usually equalling the leaves. Whorls consisting of 5—7 straight leaves. Stipulodes absent. Leaves very long, consisting of 2—3 segments, ultimate segment elongated, acuminate or mucronate. Oogonia and antheridia solitary or geminate. Oogonia nearly globular, 1200—1400 μ long (fide GROVES). Antheridia ± 1000 μ in diam. (fide GROVES).

Distribution: Europe, N. India.

Utrecht: Vreeland, Wijde Blik, 16 XI 1920; Vinkeveen, Botsholsche plas (fide VAN DER WERFF) — N. Holland: Naardermeer, Spookgat, POLAK & BUISMAN, 3 VII (N) — S. Holland: Noorden, Nieuwkoopsche plassen (pools), VERDAM, 1 VII 1934 (L, only ♀ specimens).

VI. CHARA L. *)

Key to the species.

Stem cortex haplostichous, i.e. having a single row of cortical cells to each leaf . 1. **Ch. canescens**

Stem cortex diplostichous, i.e. having two rows of cortical cells to each leaf, a central (primary) one and a lateral (secondary) one.

- Tylacanthous, i.e. primary cortical cells more prominent than the secondary, spine-cells at the sides of the cortical cells.
  - Dioecious . . . . 2. **Ch. tomentosa**
  - Monoecious.
    - Oospore with envelopment of lime, more or less incrusted.
      - Spine-cells wanting or hardly developed, solitary. Posterior bracts rudimentary. Oospore black, not exceeding 700 μ. Plant greenish grey and crumbly when dry . . . . 3. **Ch. contraria**
      - Spine-cells developed like those of *Chara hispida*. Posterior bracts very short. Oospore brown (sometimes very dark brown to black), usually ± 700 μ long . . . . 4. **Ch. aculeolata**
    - Oospore without envelopment of lime, not incrusted, exceeding 700 μ, black, with strong thorns . . . . 5. **Ch. baltica**
- Aulacanthous, i.e. secondary cortical cells more prominent than the primary ones (sometimes equally developed). Spine-cells and papillae (or when they are wanting the isodiametrical cells in the grooves) often pressed by the secondary rows.
  - Spine-cells or papillae wanting or very short and thick, solitary. Posterior bract-cells hardly developed and only visible as small papillae. 6. **Ch. vulgaris**
  - Spine-cells distinct, often fasciculate anyhow at the top-internodes.
    - Posterior bract-cells distinctly developed, usually half as long as the anterior ones . . . . 7. **Ch. hispida**

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*) All species found as yet in the Netherlands are diplostephanous (*Chara tomentosa* sometimes triplostephanous). Plants monoecious or dioecious. Stem cortex perfect.

Posterior bract-cells very short, less than half as long as the anterior ones . 4. **Ch. aculeolata**

Stem cortex triplostichous, i.e. having three rows of cortical cells to each leaf, a central (primary) one and two lateral (secondary) ones.

Dioecious.

Spine-cells developed, usually long and conspicuous. Besides some short posterior bract-cells five long bract-cells at lateral and foreside are developed.

Posterior and anterior bract-cells as long as the lateral ones. Root producing globular bulbils . . . . 8. **Ch. aspera**

Posterior and anterior bract-cells half as long as the lateral ones (when fertile leaves), without bulbils . . . . 9. **Ch. galioides**

Spine-cells wanting, only two anterior bract-cells and one posterior one, rarely two short lateral bract-cells are developed. Stem and branchlets when dried remaining distinctly terete . . . . 10. **Ch. connivens**

Monoecious.

Bract-cells developed round the leaf-segments, spine-cells long . . . . 11. **Ch. tenuispina**

Posterior bract-cells not developed or papilliform.

Without spine-cells or papillae, primary and secondary rows equally developed . . . . 12. **Ch. fragilis**

Distinct papillae or spine-cells, primary rows more prominent than the secondary ones . . . . 13. **Ch. verrucosa**

1. **Chara canescens** LOISEL. Nat. Fl. Fr. 1810, p. 139 — *Chara crinita* WALLROTH Ann. bot. 1815, p. 190, T. 3.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 187; MIG. l.c. p. 348; ROB. l.c. p. 262; HY l.c. p. 28; GROVES II l.c. p. 14; LAKOWITZ Alg. Fl. Ostsee 1929, p. 199 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 27, T. 69 I; MIG. l.c. Fig. 88; GROVES II l.c. Pl. XXVII.

Dioecious, about 15 cm high, dark green, having a single row of cells. Spine-cells so numerous that they are nearly hiding the stem, some solitary ones usually in clusters of 2—5, once to three times as long as the diameter of the stem, usually slender and acuminate. Branchlets 8—10, short, slightly incurved. Segments 5—8 all but the last usually corticate, ultimate segment often scarcely exceeding the subtending bract-cells. Bract-cells well developed, exceeding the oogonium. Stipulodes well developed. Oogonia 450—600 μ ($\pm$ 525 μ) long. Parthenogenesis. Male plants unknown in the Netherlands.

Distribution: Europe, Asia, Africa, N. America (Massachusetts to Long Island).

Formae longispinae

Lit.: MIG. l.c. p. 360.

Spine-cells longer than the diameter of the stem.

Friesland: Kornwerderzand, beach near the dike, VAN DER WERFF 3 VII 1934 (L); Takozijl, pier N. side of the sluice, VAN DER WERFF 17 VII 1937 (L), pier near sluice, VAN DER WERFF 26 VI 1935 (L) — N. Holland: IJselmeer, KOOPMANS 7 VIII 1933 (A); Sloten, LACOSTE (L, B); Sloten-Amsterdam, LACOSTE VII 1843 (B, BRAUN: *Chara crinita*); Amsterdam, VAN DEN BOSCH n. 574 (L, KÜTZING: *Chara crinita*); IJselmeer, Bocht van Wervershoof, TINBERGEN 4 IX 1936 (L).

f. γ **laxa** (MIG.)

Lit.: MIG. l.c. p. 361.

Slender, elongated, graceful form, 30—40 cm high. Spine-cells scanty, somewhat longer than the diameter of the stem. Top-segment of the leaves hardly longer than the bract-cells. Posterior bract-cells somewhat shorter than the other ones. Oogonia about 500 μ long.

N. Holland: Alkmaar, SURINGAR & ABELEVEN 20 VIII 1871 (B, acc. ad formam *laxam*).

f. λ **compacta** (MIG.)

Lit.: MIG. l.c. p. 367.

Small but robust stiff form, 3—7 cm high. Internodes 5—8 mm. Leaves 2—3 mm. Spine-cells densely congested, 1½ times as long as the diameter of the stem, stiff and brittle. Bract-cells longer, often twice as long as the leaf-segments. Oogonia about 250 μ long.

N. Holland: Sloten, LACOSTE (L, acc. ad formam *compactam*).

Formae brevispinae

Lit.: MIG. l.c. p. 371.

Spine-cells not as long as the diameter of the stem.

Friesland: Afsluitdijk near coast of Friesland, side of the IJselmeer, VAN DER WERFF 18 VII 1937; Makkumerwaard, VAN DER WERFF 18 VII 1937 (L); Makkum, inland waters at the foot of the dike, VAN DER WERFF 27 VI 1937 (L); Molkwerumerzijl, bottom of the silted sluice, VAN DER WERFF 17 VII 1937 (L); Mirnser Klif, VAN DER WERFF 17 VII 1937 (L); between Blankenham and Blokzijl, washed ashore, VAN DER WERFF 5 VII 1934 (L); Takozijl, pier near sluice, VAN DER WERFF n. 42 B, 26 VI 1935 (L); between Kornwerderzand and coast of Friesland, HOCKE HOOGENBOOM n. 146 (29), 3 VII 1934 (B).

2. **Chara tomentosa** L. Sp. Plant. 1753, p. 1156 — *Chara ceratophylla* WALLROTH (non HALSTED) Ann. bot. 1815, p. 192, t. 5.

Lit.: MIG. l.c. p. 386; HY l.c. p. 29, GROVES II l.c. p. 33, LAKOWITZ Alg. Fl. Ostsee 1929, p. 199 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 29, T. 73 I; MIG. l.c. Fig. 92, 93. GROVES II l.c. Pl. XXXII.

Dioecious, 25—30 cm high, bright to pale green or greyish green, stiff and brittle. Stem stout and thick to 2 mm in diam., usually diplo- (sometimes triplo-) stichous. Spine-cells scattered on the lower parts of the stem, crowded near the apex, length to 8 mm, obtuse to ovoid, acuminate. Stipulodes similar to the spine-cells. Leaves stout, 6—8 in a whorl, 1—3 cm long, containing 4—6 internodes of which the upper 1—3 are ecorticate and much swollen. Bract-cells 5, broadly ovoid, acuminate, the anterior ones longer than the fructifications. Oogonia about 1000 μ long. Antheridia about 1400 μ in diam. (fide GROVES).

Distribution: Europe, N. Africa, Asia, tropical and subtropical America from southern Florida and New Mexico through the West Indies and Mexico to Southern Brazil.

Formae isoptilae

Lit.: MIG. l.c. p. 397.

Bract-cells developed equally round the leaf-segments.

N. Holland: Amsterdam, in ditches, OUDEMANS VI 1872 (U).

3. **Chara contraria** A. BR. in KG. Phyc. germ. 1845, p. 258; KG. Spec. Alg. 1849, p. 523.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 187; MIG. l.c. p. 432; ROB. l.c. p. 265; HY l.c. p. 33; GROVES II l.c. p. 36 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 24, 25, T. 59, 61; MIG. l.c. Fig. 99, 100; GROVES II l.c. Pl. XXXIII.

Monoecious, 10—30 cm high, usually greyish green. Internodes 2—4 times as long as the leaves. Cortex regularly diplostichous, the primary series more prominent than the secondary. Spine-cells solitary, conspicuous only on the upper internodes, on the mature internodes ranging to small papillae. Stipulodes small. Leaves 6—8 in a whorl, incurved, to 3 cm long. Anterior bract-cells equalling or exceeding the fructifications, posterior ones reduced to papillae or wanting. Antheridia and oogonia also at ecorticate segments. Oogonia 500—1000 μ (± 700 μ) long. Nucleus 300—700 μ × 175—440 μ. Antheridia 240—350 μ (± 300 μ) in diam.

Resembling *Chara vulgaris*. However, except the individual characteristics (size of the ripe nucleus) the habitus of *Chara contraria* is more slender, flexible and graceful than the more robust *Chara vulgaris*. The stem of *Chara contraria* is narrower but more firm and solid than that of *Chara vulgaris* and very crumbly, when dry.

Distribution: Europe, Africa, Asia, Australasia, N. America.

N. Holland: Texel, Binnen Mui, MEEUSE 10 VI 1937 (L); Rozewater near Zandvoort, dunes, BUSE (BRAUN: *Chara foetida*, acc. ad *Charam contrariam*) — S. Holland: near 's-Gravenhage, Waalsdorp, VAN HALL 16 VII 1834 (B); Waalsdorp 26 VII 1854 (B).

Formae microteles

Lit.: MIG. l.c. p. 443.

Ecorticate top-segment (usually 2—3 cells) shorter or not much longer than the last corticate segment.

Utrecht: near Utrecht, GEVERS DEYNOOT n. 388 (B).

Formae macroteles

Lit.: MIG. l.c. p. 452.

Ecorticate top-segment (usually 3—5 cells) always considerable, often much longer than the last corticate segment.

Friesland: Schiermonnikoog, HOLKEMA 14 V 1868 (B) — S. Holland: Hoek van Holland, S. VI 1879 (B).

f. λ **macroptila** MIG. l.c. p. 453

At first sight looking like a *Chara vulgaris.* About 9 cm high. Internodes at the base 2—3 times as long as the leaves, at the top half as long as the leaves. Cortex normal. Spine-cells badly developed. Leaves 1—2 cm long, 2—3 fertile nodes, 2 corticate, 1 naked. The naked tip usually 3-celled, the first cell somewhat swollen and broader than the corticate nodes, 3—6 times as long as the corticate part of the leaf. Bract-cells longer than the fructifications.

Gelderland: Hoophuizen, mouth of brook, VAN DER WERFF n. 8A, 15 VII 1937 (L); IJselmeer, Hoophuizen, in front of mouth of brook, VAN DER WERFF n. 8B, 15 VII 1937 (L).

f. *ν* **capillacea** MIG. l.c. p. 455.

Slender and fine about 13 cm high. Internodes longer than the leaves, suddenly shortened at the top. Leaves very fine and characterised by the uncommonly long uncorticated end. Leaves consisting of 3—4 segments, the first 2—3 corticated and fertile, top-segment 3—4 celled to about 3 cm long; the corticated segments together about 3 mm long.

Friesland: Kornwerderzand, beach near the dike, VAN DER WERFF 3 VII 1934 (L); Molkwerumerzijl, bottom of the silted sluice, VAN DER WERFF 17 VII 1937 (L); between Kornwerderzand and coast of Friesland, HOCKE HOOGENBOOM n. 126 (29), 3 VII 1934 (B, „Chara fragilis" in Ned. Kruidk. Arch. XLVII, 1935, p. 316) — Gelderland: Hoophuizen, IJselmeer, brooklet, VAN DER WERFF 15 VII 1937 (L, acc. ad formam *capillaceam*).

var. **hispidula** A. BR. in MIG. l.c. p. 457.

Distinct spine-cells visible with the naked eye, robust specimins, stipulodes better developed, leaves and bract-cells more prominent.

Formae microteles

Lit.: MIG. l.c. p. 458.

Ecorticate top-segment shorter, sometimes equalling the last corticate segment.

N. Holland: Muiderberg, LACOSTE (L, „Chara hispida" in Prod. Fl. Bat. II, 2, 1853, p. 187; KÜTZING: *Chara stricta,* BRAUN: *Chara contraria* var. *hispidula*).

4. **Chara aculeolata** KG. in Reich. Fl. germ. exc. II, 1832, p. 843 — *Chara papillosa* KG. in Flora II, 1834, p. 707 — *Chara intermedia* A. BR. in Fl. Krypt. bad. ined.

Lit.: MIG. l.c. p. 488; ROB. l.c. p. 267; GROVES II l.c. p. 33, 42, 47, 49, 50 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 27, 28, T. 67 II, 70 I; MIG. l.c. Fig. 110, 111, 112, 113.

Monoecious. Very variable species usually looking like an intermediary form between *Chara contraria* and *Chara hispida,* 5—25 cm high, usually 20 cm, in habitus for the greater part resembling *Ch. hispida,* shorter forms forming tufts. Stem to 2 mm in diam. Primary cortex rows not distinctly prominent, to the aspect of the cortex like that of *Ch. hispida.* Stipulodes conspicuous. Spine-cells from quite short and scarce (like papillae) to well developed and dense at least at the top-internodes, sometimes wanting at the lower internodes. Leaves 7—10 in a whorl. Segments 5—7, usually 6 (3 fertile). The ecorticate top-segment of very different form and length. Bractcells all developed, sprucefir-like and rigidly patent, posterior ones shorter. Oogonia 500—1200 μ (± 900 μ) long; nucleus 450—850 μ (± 700 μ) long. Antheridia 230—475 μ (± 375 μ) in diam.

Resembling *Chara contraria,* but *Ch. contraria* has a nucleus not exceeding 700 μ (*Chara aculeolata* having a nucleus usually exceeding 680 μ) and when dried, *Ch. aculeolata* is not crumbly like *Ch. contraria.* Habitus more robust. At first sight to be distinguished from *Ch. hispida* by the usually less rigid and robust habitus. The posterior bract-cells of *Ch. aculeolata* are less developed than those of *Ch. hispida.* Top-segment of the leaves of *Ch. aculeolata* often ecorticate, long and swollen.

Distribution: Europe, N. & S. America.

Formae papillosae

Lit.: MIG. l.c. p. 497.

Stem with small papillae, usually only twice as long as broad.

N. Holland: Texel, Binnen Mui, MEEUSE 10 VI 1937 (L); Sloten, in ditches of the Haarlemmermeer, LACOSTE VI 1847 (L); Zeeland: Duiveland, DOZY (L).

f. *α* **elongata** (A. BR.)

Lit.: MIG. l.c. p. 497.

The largest of all forms (exceeding 40—60 cm, diameter of the stem 2 mm). Habitus like that of *Ch. hispida.* The top-segment is usually one-celled and ecorticate, short, often hardly longer than the bract-cells of the last segment.

N. Holland: in the Alloo in Texel, between Koog—Westen, HOLKEMA 16 VIII 1868 (B).

Formae aculeolatae

Lit.: MIG. l.c. p. 503.

Stem with distinct spine-cells, partly solitary, partly crowded, moretimes longer than broad.

Utrecht: Vinkeveen, Botsholsche plas, VAN DER WERFF 29 X 1937 (L).

In literature there is no agreement about the nomenclature nor about the limitations of this species. KÜTZING distinguished two species: *Chara aculeolata* (in REICHENBACH Flor. germ. exc. II, 1832 add. p. 843, Phyc. gen. 1843, p. 320, Tab. Phyc. VII, 1857, p. 27, T. 67 II, type from Tennstaedt) and *Chara papillosa* (in Flora II, 1834, p. 707; Tab. Phyc. l.c. p. 28, T. 70 I, type from Mansfeld). GROVES concludes on the ground of the Exsiccata of REICHENBACH (n. 426) to transfer the species *Ch. aculeolata* to *Ch. polycantha* A. BR., whereas MIGULA l.c. p. 488, 489 transfers *Ch. aculeolata* as well as *Ch. papillosa* to *Ch. intermedia* A. BR. According to GROVES II l.c. p. 50 the REICHENBACH Exsiccata n. 426 should be a weak sterile form of *Chara polyacantha.* The REICHENBACH Exsiccata n. 426, that was kindly sent us on loan by the Botan. Museum, Berlin, is fertile and as well developed as the sterile type specimen from Tennstaedt. However, both fertile and sterile specimens, of this *Chara aculeolata* KG. do not show much resemblance to *Chara polyacantha.* In any case they are clearly to be distinguished from *Chara polyacantha.*

Now it appears that *Ch. intermedia* A. BR. is a synonym of *Ch. papillosa* KG., among others from the letter written by A. BRAUN to KÜTZING concerning the specimens of the type collection (Mansfelder See). At present the type collection of *Chara papillosa* KG. is preserved in the National Herbarium, Leiden. The letter mentioned above is copied here:

Chara papillosa KÜTZING.

Diese Pflanze bildet wirklich eine besondere Species (Unterart der Ch. foetida nach meiner Zusammenstellung der Arten), die zwischen Ch. vulgaris und hispida im Habitus und der Grösse der Samen die Mitte hält, in der Berindung aber mit meiner Ch. contraria übereinstimmt. Ich habe sie, ehe ich Ihre Pflanzen kennte (in dem schon seit mehreren Jahre gedruckten Anfang der Fl. bad. crypt.) Ch. intermedia genannt. Die mir ehemals bekannten wenigen Formen sind jedoch ziemlich abweichend von der Ihrigen, in welcher ich einen neuen Form dieser, wie mir scheint, äusserst seltenen Art kennen lerne, nämlich meinen forma macroteles condensata.

Mit Ch. ceratophylla hat die papillosa keinen Verwandtschaft, da sie monoecisch ist, ceratoph. aber diöcisch. A. Br. 1840.

Specimens belonging to *Ch. aculeolata, Ch. papillosa* as well as intermediary forms have been identified well by Braun as *Ch. intermedia* A. Br. So Migula was right in uniting *Ch. aculeolata, Ch. papillosa* and *Ch. intermedia*. According to the Rules of Nomenclature the name of this species has to be *Ch. aculeolata* Kg.

5. **Chara baltica** (Hartm.) Fries in Aspegr. Försök till Bleh. Flor. 1823, p. 13 — *Chara hispida* var. *baltica* Hartman Skand. Fl. 1820, p. 376.

Lit.: Mig. l.c. p. 515; Rob. l.c. p. 267; Hy l.c. p. 35; Groves II l.c. p. 44; Lakowitz Alg. Fl. Ostsee 1929, p. 200 — *Ill.:* Kg. Tab. Phyc. VII, 1857, p. 26, T. 63 II, 64 I; Mig. l.c. Fig. 114, 115; Groves II l.c. Pl. XXXVI.

Monoecious, dark green, incrustation not visible. The lower nodes swollen, root bulbs with storefood. Cortex regularly diplostichous, the primary cortical cells slightly larger and more prominent. Spine-cells rather dense, solitary or many together, stout and acuminate. Stipulodes well developed. Leaves 8—11 in a whorl. Segments 5—7 (top-segment ecorticate, sometimes also the preceeding one). Bract-cells all developed. Oogonia ± 1000 μ. Antheridia 500—600 μ in diam. (fide Groves).

Distribution: England, Sweden, Finland, Denmark, N. W. Germany, N. America (Greenland), S. America (Bolivia).

Formae majores

Lit.: Mig. l.c. p. 528.

Robust forms of middle size with long internodes and relatively short leaves, 8—9 in a whorl.

f. ζ **typica** Mig. l.c. p. 528.

Moderately robust to 30 cm high, with thick short leaves. Stem 1 mm in diam. Internodes 3—4 times as long as the leaves. Cortex normal, cortical cells with thick walls. Spine-cells scattered at the lower internodes, dense at the upper ones, equalling the diameter of the stem or longer. Stipulodes well developed, visible with the naked eye. Leaves 8 in a whorl to 2 cm. Segments 5—6 (3—4 fertile) top-segment ecorticate (2—3-cells) exceeding in length the preceding corticate segment. Bract-cells small, stiff and acuminate, the lateral ones exceeding the oogonia, the anterior ones shorter. Oogonia 360—550 μ (± 500 μ) long. Antheridia 225—300 μ (± 250 μ) in diam.

N. Holland: between Amsterdam and Sloten, Sloterweg, LACOSTE IX 1853 (L, acc. ad formam *typicam*).

6. **Chara vulgaris** L. Sp. Plant. 1753, p. 1156, emend. WALLROTH.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 187; MIG. l.c. p. 554; ROB. l.c. p. 269; HY l.c. p. 30; GROVES II l.c. p. 18 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 24, 25, T. 58, 59 II, 60, 72 II; MIG. l.c. Fig. 122; GROVES II l.c. Pl. XXVIII.

Monoecious, 10—50 cm high. Habitus variable, bright, pale or brownish green. Stem to 1.2 mm in diam., moderately stout, cortex double; secondary cortical rows somewhat wider and more prominent than the primary ones. Spine-cells solitary, more or less obtuse, papilliform or nearly wanting. Leaves incurved, spreading or recurved, 6—11 in a whorl, to 3 cm long, containing 3—5 corticate segments and an incorticate 2—3-celled leaf tip. Anterior bract-cells different in length, sometimes shorter, sometimes much longer than the oogonia. Posterior bract-cells small or wanting. Oogonia to 800 μ long. Antheridia to 500 μ in diam.

Almost cosmopolitan species (in the extreme North of Europe wanting).

Formae subinermes

Lit.: MIG. l.c. p. 566.

Papillae extremely small, smaller than the stipulodes. Oospore brown.

Friesland: Kornwerd, IJselmeer, VAN DER WERFF 18 VII 1937 (L); near Sneek, BERGSMA (B); Makkumerwaard, VAN DER WERFF 18 VII 1937 (L); Makkum, outside the Waard, VAN DER WERFF 27 VI 1937 (L); Makkum, inland water-way near the dike, VAN DER WERFF 27 VI 1937 (L) — Utrecht: Maarssen, WENT 1882 (U); near Utrecht, GEVERS DEYNOOT n. 387 (B) — N. Holland: Sloten, ditches in Haarlemmermeer, LACOSTE (B) — S. Holland: Kagermeer, COOL 4 VII 1921 (L); Wassenaar, STEKHOVEN n. 999 and n. 1000 (B); near 's-Gravenhage, VRIJDAG ZIJNEN (U); near Rotterdam, OUDEMANS 1850 (B, A, BRAUN: *Chara foetida*), OUDEMANS V 1850 (B, BRAUN: *Chara foetida* A. BR., *Chara vulgaris* auct. ex parte) — Zeeland: Goes, in ditches, VAN DEN BOSCH (B); Kloetinge-Kapelle, ditch, LACOSTE IV 1839 (L).

f. *α* **normalis** MIG. l.c. p. 566.

About 30 cm high, slender form. Spine-cells small and scanty. Leaves 7—8 in a whorl, half as long as the internodes, somewhat curved upwards, 3 corticate fertile bract-cells and one ecorticate top-segment (3 cells) as long as the corticate part of the leaf. Posterior bract-cells very small (only papillae). Anterior and side bract-cells about twice as long as the oogonia. Ripe oospores bright chestnut coloured, 480 μ long.

S. Holland: Waalsdorp, ditches in the dunes, VRIJDAG ZIJNEN (B).

f. β **longibracteata** (KG.)

Lit.: KG. in REICHENB. Fl. exc. 1832, p. 843; MIG. l.c. p. 567 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 25, T. 60 I; MIG. l.c. Fig. 123; GROVES II l.c. Pl. XXIX, 3.

About 40 cm high. Stem moderately stout. Cortex regular. Spine-cells short to rudimentary, appressed. Leaf-segments elongated, the ultimate 2—3 ecorticate, usually forming flagelliform ends. Anterior and side bract-cells very long to 10 times as long as the oogonium.

Friesland: St. Jacobi Parochie, VAN HALL 15 VII 1829 (B); Makkumerwaard, VAN DER WERFF 18 VII 1937 (L); Molkwerumerzijl, bottom of the silted sluice, VAN DER WERFF 17 VII 1937 (L); Mirnser Klif, VAN DER WERFF 17 VII 1937 (L); Takozijl, pier of N. side of the sluice, VAN DER WERFF 17 VII 1937 (L) — Groningen: Euvelgunne, POSTMA 13 VI 1905 (G); Esserweg, POSTMA 8 VII 1906 (G); Oostwolde, ditch in peatmoor, POSTMA 27 VI 1906 (G); Groningen, outside Apoort, STRATINGH (G) — Overijsel: Kampen, ditches, BONDAM VIII 1847 (L, KÜTZING: *Chara vulgaris* var. *longibracteata*); Vollenhoven, ditches between sea and dike, JANSEN & WACHTER (Unio) VII 1928 (L) — Gelderland: Berkel, trench in hayfield, 13 VII 1859 (B) — Utrecht: Eembrug-Bunschoten, ditches in peatmoor, WENCK V 1845 (L); Utrecht, NIJLAND? 1869 (L), LACOSTE (B, BRAUN: *Chara polysperma* est forma *Charae foetidae*); near Koningslust, BROERS (A) — N. Holland: Amsterdam, ditches in brackish claysoil, OUDEMANS n. 842 1 VI 1872 (L, B, G, U, A); IJselmeer, Bocht van Wervershoof, TINBERGEN 29 VIII 1936 (L); Amsterdam, J. W. MOLL 1 VI 1872 (G); Amsterdam, LACOSTE (L); Zandvoort, valley in the dunes near Rozewater, BUSE (L, BRAUN: *Chara foetida*); Zandvoort, VAN DER TRAPPEN (L, mixed up with one piece of the *subhispidae* group, BRAUN: *Chara foetida* cum var. *subhispida*); Halfweg near Haarlem, LACOSTE VIII 1855 (L, BRAUN: *Chara foetida* A. BR.); Sloten, in Haarlemmermeerpolder, LACOSTE IX 1853 (L, mixed up with *Chara fragilis*, BRAUN: *Chara foetida* A. BR.); Sloten, ditches in Haarlemmermeer, LACOSTE n. 1901 (B, mixed up with a form of the *subhispidae* group); Haarlem, SPLITGERBER (B); Haarlemmerhout, SPLITGERBER VI (B) — S. Holland: near Leiden, DOZY (L, KÜTZING: *Chara vulgaris* WALLR.); Leiden, STEKHOVEN? (L); Waalsdorp, ditch, VRIJDAG

ZIJNEN (U, mixed up with a form of the *paragymnophyllae* group); Waalsdorp, VRIJDAG ZIJNEN (A); near 's-Gravenhage, G. BISSCHOP (L, BRAUN: *Chara foetida,* forma *subinermis, longibracteata, elongata*); Loosduinen, ditch near 's-Gravenhage, VRIJDAG ZIJNEN (B, BRAUN: *Chara foetida* acc. ad var. *subhispidam*); Lekmond, little creeks of the Lek, VAN HALL 28 VII 1832 (B); Rotterdam, puddle in sand, JONGMANS & WACHTER 10 X 1937 — Zeeland: Zierikzee—Nieuwerkerk, brackish ditches, DOZY (B); Zuid-Beveland, VAN DEN BOSCH (L); Axel, ditches, WALRAVEN XII 1855 (L, BRAUN: *Chara foetida* f. *longibract. elongata, Ch. longibract.* K.); Hoek, in pits in a boggy field, WALRAVEN 29 VII 1854 (L, BRAUN: *Chara foetida*); St. Fenabtsdorp, VAN DEN BOSCH IV 1840 (L, BRAUN: *Chara foetida* forma *longibract. elongata, Ch. longibract.* K!) — N. Brabant: Empelsche dijk, ditch in a clayish soil, LACOSTE IX 1847 (L, KÜTZING: *Ch. vulgaris*); 's-Hertogenbosch, LACOSTE XI 1847 (B).

f. **polysperma** (KG.) — *Chara polysperma* KG. Phyc. germ. 1843, p. 258.

To 30 cm high. Stem slender and graceful. Plant bright green to dark green. Branchlets 7—9 in a whorl, nearly perpendicularly (± 80°) patent. Tip of the leaves very slender, slightly curved up. Segments short, each segment with a pair of oogonia and antheridia in the upper whorls too, giving the plant a very dotted aspect. Bract-cells shorter than or equalling the oogonia. Oogonia globose to ovoid, white to yellow brownish 600—750 μ (± 700 μ) long.

Friesland: near Sneek, BERGSMA (B) — Overijsel: Kampen, in a ditch (L) — Utrecht: Utrecht, VAN DER TRAPPEN (L, KÜTZING: *Chara polysperma* KG.), BEINZ 1869 (B) — N. Holland: Texel, VAN EEDEN VIII 1867 (B), HUIZINGA VIII 1867 (B); Sloten, Haarlemmermeerpolder, LACOSTE IX 1853 (L, BRAUN: *Chara polysperma* KG. ist eine *Chara foetida brevibracteata*); Sloten, ditches in Haarlemmermeer, LACOSTE VI 1847 (B), LACOSTE (L, BRAUN: *Chara foetida* forma *brevibract. munda, Ch. punctata* LEBEL); Heemstede (L).

f. **seminuda** (KG.) — *Chara seminuda* KG. Tab. Phyc. VII, 1857, p. 24, T. 59 II — *Chara stricta* KG. Spec. Alg. 1849, p. 524.

To 30 cm high. Stem relatively thick, with very prominent primary rows. Plant greenish grey. Papillae very small and only visible when magnified, at the upper internodes. Leaves naked except one or two segments. Anterior bract-cells very well developed (to 3 mm long), posterior ones not developed.

N. Holland: Texel, ditch near Binnen Mui J 4, 23, 23, MEEUSE n. 184 19 VIII 1937 (L); Bentveld near Haarlem, VAN HALL (B, sterile)

— S. Holland: Oegstgeest, ditch, herb. PERIN IV (B, sterile, BRAUN: *Chara foetida* forma *major stricta, Ch. funicularis* THUILL.); Oegstgeest, Morschebelsche polder, STEKHOVEN n. 999 5 V 1833 (B, sterile, BRAUN: *Chara foetida* forma *major stricta, Ch. funicularis* THUILL.).

Formae subhispidae

Lit.: MIG. l.c. p. 575.

Papillae usually visible with the naked eye, longer than the stipulodes, about as long as the diameter of the stem. Oospore brown.

Overijsel: Kampen, ditches (L) — N. Holland: Zandvoort, LACOSTE (L); Langerak, Haarlemmerduinen, dunes 13 VI 1883 (B); Leiden, ditches, OUDEMANS & MOLKENBOER n. 122, VII 1847 (L), in ditches outside Marepoort, OUDEMANS VII 1847 (B, BRAUN: *Chara foetida* var. *subhispida*); Wassenaar, ditch, STEKHOVEN n. 1000, 24 II 1833 (B, 2 plants, which BRAUN identified as A. *Chara foetida subhispida*, B. *Chara hispida*).

Formae paragymnophyllae

Lit.: MIG. l.c. p. 603.

Leaves usually with less than two corticate segments.

Overijsel: Bathmen, pools in the moor, Unit. 1850 (B) — Gelderland: Zuid Loo, ditches, ABELEVEN (B) — S. Holland: Oegstgeest, STEKHOVEN (B); Waalsdorp, ditch, VRIJDAG ZIJNEN (U) — N. Brabant: Akersloot, ditch near Limmen, VAN GOOR 7 V 1919 (L).

7. **Chara hispida** L. Sp. Plant. 1753, p. 1153, ex parte.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 187; MIG. l.c. p. 624; ROB l.c. p. 269; GROVES II l.c. p. 29 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 26, 27, T. 65, 67 I; MIG. l.c. Fig. 130, 131; GROVES II l.c. Pl. XXXI.

Monoecious. Most robust species, to 70 cm, stem stout and stiff. Primary and secondary rows of the cortex equally developed, cells often tapering to the top. Sometimes cortex-cells forming a loop, whereas the internode is partly naked. Spine-cells in the furrows solitary, geminate (side by side) or by three, stiff and acuminate, usually wanting at the lower internodes. Stipulodes well developed. Leaves stiffly patent, long and incurved. Anterior bract-cells elongated longer than the oogonium, posterior ones shorter. Oogonia solitary 600—1000 μ (± 750 μ) long. Antheridia solitary 225—450 μ (± 350 μ) in diam.

Distribution: Europe, Asia (Siberia), N. Africa.

Formae macracanthae

Lit.: MIG. l.c. p. 631.

Spine-cells as long as or longer than the diameter of the stem.

Utrecht: Eembrug—Bunschoten, briny ditches, WENCK (L) —

N. Holland: Muiderberg, LACOSTE (L, KÜTZING: *Chara hispida*); Sloten, ditches in Haarlemmermeer, LACOSTE VI 1847 (B) — S. Holland: Leiden, MOLKENBOER VI 1836 (L, KÜTZING: *Chara hispida*) — N. Brabant: Hooge Zwaluwe—Wagenberg, Herb. W. F. VAN HALL 3 VI 1926 (L).

f. *α* **typica** MIG. l.c. p. 631.

Robust form, to 65 cm long. Internodes very long, to 13 cm. Older internodes having irregular cortex. Spine-cells at the lower internodes scanty, at the upper ones usually fasciculated. Whorls of about 10 leaves, each leaf consisting of 4 corticate (3 fertile) segments and one naked tip of 3—4 cells. Anterior bract-cells twice as long as the oogonia, the posterior comparatively diminishing to the lower internodes.

Gelderland: Sandberg, marsh near the Waterline, LACOSTE VI 1845 (B) — Utrecht: Haastrecht, in ditches, PULLE, DE VRIES & UITTIEN VII 1924 (U) — N. Holland: Texel, pools behind de Hoorn, HOLKEMA 23 VI 1868 (B); near Zandvoort, valley in the dunes, VAN DER TRAPPEN (B); Haarlem, VAN HALL (mixed up with *Chara vulgaris* L. *subinermes* and *Chara vulgaris* L. *subinermes* forma *normalis* (MIG.)); Haarlem, ditch near Mariënberg, OUDEMANS n. 648 6 VI 1871 (B, G, U, A) — S. Holland, Noorden, Nieuwkoopsche plassen, VERDAM 1 VII 1934 (L); Leimuiden, 5 VII 1882 (B, mixed up with *Chara fragilis* DESV. *mikroptilae*); Boekhorst, pond, summer 1859 (B); near 's-Gravenhage, ditches in peat, VRIJDAG ZIJNEN (B); Naaldwijk, VAN DER TRAPPEN (B, BRAUN: *Chara hispida*); Rockanje, Voorne Quackjeswater, VERDAM 17 VI 1934 (L) — Zeeland: near Hulst, ditches, VAN DEN BOSCH VI 1845 (B).

f. *β* **robustior** MIG. l.c. p. 632.

Very robust, to 60 cm high, forming sprucefir-like tufts. Stem 2 mm in diam., rough and crumbly. Internodes about 4 cm long, leaves thick, about 2 cm long. Very spiny; many spines at the older internodes. Spine-cells as long as the diameter of the stem. Stipulodes developed .Leaves containing 5 corticate (3—4 fertile) segments and an ecorticate leaf-tip of 2—3 cells. Bract-cells developed around, shorter but thicker than the spine-cells; posterior ones shorter, anterior ones slightly longer than the oogonium. Much incrusted.

N. Holland: Sloten, Haarlemmermeer, LACOSTE VI 1847 (L, acc. ad formam *robustiorem*).

f. *ε* **submunda** MIG. l.c. p. 633.

Plants green with greyish bloom. Robust, slightly incrusted form, about 20 cm high. Spine-cells as long as the diameter of the stem, usually solitary, sometimes geminate. Stipulodes well developed. Leaves containing 4 corticate (3—4 fertile) much swollen segments and 3 naked ultimate cells; ecorticate part as long as a corticate leaf-segment.

N. Holland: Muiderberg, ditches, LACOSTE VI 1847 (L).

Formae micracanthae

Lit.: MIG. l.c. p. 636.

Spine-cells shorter than the diameter of the stem.

S. Holland: Waalsdorp, well in dune valley, STEKHOVEN 7 V 1833 (B, BRAUN: *Chara hispida* auct. forma *subinermis*).

8. **Chara aspera** WILLD. Mag. Ges. Nat. Fr. Berlin III, 1809, p. 298.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 186; MIG. l.c. p. 653; ROB. l.c. p. 281; GROVES II l.c. p. 51; Lakowitz Alg. Fl. Ostsee 1929, p. 202 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 21, T. 51 II c and g, 52; MIG. l.c. Fig. 134, 135; GROVES II l.c. Pl. XXXIX.

Dioecious, to 20 cm high. Tender, graceful form, dull or pale green. Stem slender, thread-like and internodes long. Spine-cells variable, usually well developed and frequent, solitary, 2—5 together or bulbously based. Stipulodes developed well, base often bulbous. Leaves 7—10 in a whorl, slender and rather weak. Bract-cells all developed, anterior ones long. Production of spherical 1-celled whitish root-bulbils, 1 mm in diam. Oogonia at the lowest 2—3 segments, solitary, 275—700 μ (± 375 μ) long. Antheridia solitary, 250—450 μ (± 350 μ) in diam.

Distribution: Europe, Central Asia, N.W. Africa, N. America. Not known from the Southern Hemisphere.

Formae longispinae

Lit.: MIG. l.c. p. 661.

Spine-cells at least at some internodes as long as or longer than the diameter of the stem.

Utrecht: Vinkeveen, Botsholsche plas, VAN DER WERFF 29 X 1937 (L, sterile).

f. *α* **longispina** MIG. l.c. p. 661.

Brownish green plant, 15—25 cm high. Internodes 2 cm. Spine-cells solitary, twice to more times as long as the diameter of the stem. Whorl of 7—8 leaves, lower part incurved to the stem, upper part recurved outwards. Segments usually 7 (3—4 fertile).

S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. *ζ* **gracilis** MIG. l.c. p. 664.

Graceful, bright green plant, 20—30 cm high, much branched, having fresh from the water a prickly aspect caused by the sprucefir-like patent leaves. Stem fine, threadlike, smooth and shiny. Spine-cells scattered at the upper internodes, at the lower usually wanting, somewhat longer than the diameter of the stem. Whorl of 8 leaves each having 8 segments (3 fertile).

S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. ι **brachyphylla** MIG. l.c. p. 666.

Distinct form, about 20 cm high, greenish yellow. Internodes 2—3 cm, 4—6 times as long as the leaves. Stipulodes well developed. Leaves 4—5 mm long, 7—8 in a whorl, incurved and congested, forming a globule. Segments 7—8 (2—3 fertile), top-segment (1—2 cells) naked, very pointed.

N. Holland: Texel, near de Hoorn, HOLKEMA 23 VI 1868 (B) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. κ **caespitosa** MIG. l.c. p. 667.

15—20 cm high, much branched at the lower internodes. Internodes about 2 cm long. Leaves 7 in a whorl; the upper whorls 5 mm long, the middle internodes 9—12 mm long, increasing in length from the upper to the lower whorls. Segments 6—7 (2 fertile), top-segment (1—2 cells) naked, very short. Bract-cells very short.

S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. μ **tenuispina** MIG. l.c. p. 668.

An intermediary form between forma *brachyphylla* and forma *caespitosa.* About 20 cm high. Internodes 1—2 cm long. Characteristic are the spine-cells, 3—4 times as long as the diameter of the stem, sometimes in pairs, slightly curved, bulbously swollen at base. Leaves 8 in a whorl, segments 7 (2 fertile). Bract-cells long.

N. Holland: Texel, Geul, MEEUSE 8 VI 1937 (L) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. ν **stagnalis** MIG. l.c. p. 668.

Bright green plant, 15—20 cm high, much branched. Internodes of one plant of very unequal length, varying from 0.5 to 3 cm. Leaves 7—8 in a whorl, different in length in one whorl; length about 8 mm. Segments 7 (1 fertile).

Friesland: Veenwouden, pools, SPREE? 23 VII 1854 (B, mixed up with *Chara fragilis* DESVAUX and *Nitella hyalina* (DC.) AG.) — N. Holland: Terschelling, Doodemanskisten, HOLKEMA 27 VIII 1869 (B) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. ξ **tenuifolia,** MIG. l.c. p. 669.

Bright green plant, hardly 15 cm high. Internodes to 2.5 cm long. Spine-cells solitary, twice as long as the diameter of the stem. Stipulodes short ($^1/_3$ of the length of the spine-cells). Leaves 7—8 in a whorl; characteristic are the 5 very long ecorticate segments and a naked very short top-segment, 2 fertile segments. Bract-cells developed only when fertile.

N. Holland: Texel, pools in the dunes behind de Hoorn, HOLKEMA 23 VI 1868 (B); Texel, HOLKEMA 16 VII 1868 (B) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. *ο* **macrostephana,** MIG. l.c. p. 670.

Dirty green plant giving a downy aspect, to 20 cm high. Internodes to 2 cm, fine. Spine-cells to four times as long as the diameter of the stem, solitary. Stipulodes well developed, upper ones often much longer than the spine-cells. Leaves 6—8 in a whorl, in the upper whorls already well developed, patent like the leaves of a palm. Segments 6 (2 fertile). Bract-cells around very well developed and thus giving a downy aspect to the plant.

N. Holland: Texel, pools in the dunes behind de Hoorn, HOLKEMA 23 VI 1868 (B) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L).

f. *π* **streptophylla** MIG. l.c. p. 670.

Lit.: LAKOWITZ l.c. p. 202.

Small, bright green form to 10 cm high, has come resemblance to forma *tenuifolia,* but forma *streptophylla* is much smaller. Internodes 1—1.5 cm, usually shorter than the leaves. Stipulodes well developed. Leaves 6 in a whorl, about 12 mm long, stiff and somewhat torted. Segments 6 corticate and one ecorticate. Plants only found sterile in the Netherlands (MIGULA saw only sterile plants too).

Groningen: Harendermolen, shallow water, VAN HALL 9 VI 1858 (B) — N. Holland: Texel, between Koog and Nieuwe Aanleg, HOLKEMA 16 VII 1868 (B), Alloo, between Koog and Nieuwe Aanleg, HOLKEMA 16 VII 1868 (B) — S. Holland: Voorne, Quackjeswater, VERDAM 17 VI 1934 (L) — N. Brabant: Budel, LACOSTE VIII 1874 (B).

Formae brevispinae

Lit.: MIG. l.c. p. 674.

Spine-cells shorter than the diameter of the stem, sometimes nearly visible.

Friesland: Veenwouden, SPREE 23 VII 1854 (B) — Groningen: Groningen, Apoort (G) — Overijsel: Kampernieuwstad, reed-land, IJselmeer, VAN DER WERFF 15 VII 1937 (L) — Utrecht: Zeist, KRAEPELIEN n. 388 (B); Achttienhoven, LACOSTE (B); Jutphaas (L, acc. ad formam *vulgarem* MIG.) — N. Holland: Vlieland, DE VRIES VIII 1937 (L); Naardermeer, POLAK & BUISMAN (N) — S. Holland: Naaldwijk, ditch and pool, VAN DER TRAPPEN (B, BRAUN, *Chara aspera*).

9. **Chara galioides** DC. in Catal. horti Monspel. 1813, p. 93.

Lit.: MIG. l.c. p. 685; HY l.c. p. 40; GROVES II l.c. p. 57 — *Ill.:* MIG. l.c. Fig. 137, 138; HY l.c. Pl. III, fig. 59.

Dioecious, to 25 cm high. Stem moderately stout, diameter 1.5 mm. Internodes 2—3 cm long. Cortex irregularly triplostichous. Spine-cells variable in number and form. Stipulodes well developed. Leaves 6—8 in a whorl, about 2 cm long. Segment 4—7 corticate, top-segment ecorticate, 3-all segments fertile. Nodes thick and filled up with storefood, increasing in size to the lower nodes and there forming bulbs to 2.5 mm. in diam. Anterior bract-cells twice as long as the fructifications, posterior ones not developed. Oogonia ± 900 μ long. Antheridia ± 1000 μ in diam. (fide GROVES).

To be distinguished from *Chara aspera* by the size of the whole plant, especially of the antheridia and the lack of bulbils.

Distribution: Schleswig Holstein, France, Spain, Italy, N. Africa.

S. Holland: Voorne, Branddijk pool, DE LEEUW 13 VI 1934 (L, only feminine specimen).

10. **Chara connivens** A. BR. in Flora XVIII, 1, 1835, p. 73.

Lit.: MIG. l.c. p. 703; HY l.c. p. 41; GROVES II l.c. p. 57; LAKOWITZ Alg. Fl. Ostsee 1929, p. 203 — *Ill.:* KG. Tab. Phyc. VII, 1857, p. 26, T. 63 I; MIG. l.c. Fig. 142, 143; GROVES II l.c. Pl. XLI.

Dioecious. Much variable species, pale green. Stem graceful and glossy, more rigid than that of *Ch. aspera*. Cortex even and round also when dry. Spine-cells as well as stipulodes rudimentary. Leaves 6—9 in a whorl, distinctly connivent to the stem, evenly corticate and terete. When dried leaves somewhat curled, 8—9 segments, upper ones 1—2 ecorticate. Bract-cells shorter than the fructification. Oogonia solitary at the lowest 2—3 segments, ± 750 μ long. Antheridia 600—700 μ in diam. (fide GROVES).

Distribution: W. Europe, N. Africa.

Friesland: Afsluitdijk near coast of Friesland, side of the IJselmeer, VAN DER WERFF 18 VII 1937 (L).

f. *α* **major** MIG. l.c. p. 709.

Robust form, 20—25 cm high. Stem 0.6 mm in diam. Internodes at the lower part of the stem 3—4 cm long, at the upper part 1—2 cm long. Stipulodes much reduced. Leaves about 1 cm long, 8 in a whorl. Segments 7—9, top-segment naked, broad at the base. First 3—4 segments fertile. The two leaflets pressed to the antheridia and very small. Leaflets of female specimens 5, halfs as long as the oogonia.

Friesland: Makkum, inland water-ways at the foot of the dike, VAN DER WERFF 27 VI 1937 (L, acc. ad formam *majorem*).

f. β **laxa** MIG. l.c. p. 710.

Slender and short form, about 25 cm high. Stem filiform and when dry, solid, terete and glossy. When dried, stem and leaves curled and fragile. Internodes very long, 4—6 cm. Spine-cells wanting, stipulodes minute. Leaves 8 in a whorl. Segments 8—9 (one naked). Oogonia ± 480 μ long. Antheridia 250—500μ (± 350 μ) in diam.

N. Holland: IJselmeer, Bocht van Wervershoof, TINBERGEN 29 VIII 1936 (L).

f. γ **gracilescens** MIG. l.c. p. 711.

Slender form, about 15 cm high. Stem slightly curved. Internodes at the lower part 3—4 cm, at the upper part 1—2 cm, irregularly long at one and the same stem. Stipulodes minute, developed as warts. Leaves 7—8 in a whorl, fine, about 1 cm long, at female specimens straight, at male specimens incurved to the stem. Segments about 7 (one naked top-cell).

Friesland: Afsluitdijk, near coast of Friesland, side of the IJselmeer, VAN DER WERFF 18 VII 1937 (L); Mirnser Klif, VAN DER WERFF 17 VII 1937 (L); Harderwijk, Essenburg, BONDAM VII 1866 (B). All acc. ad formam *gracilescentem*.

f. δ **longifolia,** MIG. l.c. p. 711.

Very slack form, about 15 cm high with very long leaves. Stem 0.6 mm in diam., slack and flexible, sunken and flat when dry. Internodes at the lower part 4 cm long, gradually diminishing to 1 cm at the upper part. Stipulodes minute. Leaves 8 in a whorl, very long, 2.5—5 cm, usually about 3 cm long, fine and slender, curved. Segments 9—13 (one naked top-cell). Leaflets short.

Friesland: Takozijl, pier N. side of the sluice, VAN DER WERFF 17 VII 1937 (L, acc. ad formam *longifoliam*).

f. ε **minor** MIG. l.c. p. 712.

Small form about 6 cm high, glabrous. Stem about 0.5 mm in diam., hard, round and glossy. Internodes 2—20 mm, usually 10 mm long. Stipulodes developed as small warts. Leaves 7 in a whorl, straight or somewhat incurved, stiff and naked, 3—20 mm, usually about 10 mm long. Segments 7 (one naked top-cell), 1-celled and small at the relatively thick last corticate segment.

Friesland: Afsluitdijk near coast of Friesland, side of the IJselmeer, VAN DER WERFF 18 VII 1937 (L); Kornwerd, coast of the IJselmeer, VAN DER WERFF 18 VII 1937 (L); Makkumerwaard, VAN DER WERFF

18 VII 1937 (L) — Gelderland: Wisselsche veenen, peatmoors, Kok Ankersmit 1 VII 1876 (B). All acc. ad formam *minorem*.

11. **Chara tenuispina** A. Br. in Flora XVIII, 1, 1835, p. 68.

Lit.: Mig. l.c. p. 715 — *Ill.:* Mig. l.c. Fig. 145.

Monoecious and therefore and by the long spine-cells immediately to be distinguished from the other triplostichous species. 25 cm high. Stem slender, corrugated. Cortex not quite regular. Spine-cells long and fine. Stipulodes developed. Leaves 9—10 in a whorl, to 1.5 cm long. Segments 6—8 (the last 1—2 naked). Anterior bract-cells twice as long as or longer than the oogonia, posterior ones half as long as the oogonia. Oogonia 650—800 μ long. Antheridia 250—300 μ in diam. (fide Mig.).

Distribution: Germany, Austria, Switzerland.

f. α **major** Mig. l.c. p. 721.

Ill.: Mig. l.c. Fig. 144.

Long stretched form about 50 cm, ramifications few. Internodes to 7 cm, leaves to 2.5 cm and bract-cells ± 2 mm long. Cortex normal, spine-cells sparse, fine and long. Cortex of the leaves sometimes unequal, sometimes all segments but one corticated, sometimes 2—4 ecorticate; bract-cells developed. Oogonia ± 700 μ long. Antheridia ± 250 μ in diam.

N. Holland: Texel, valley in the dunes of Schapebroek, Meeuse 8 VI 1937 (L) — Presumably Zeeland, van den Bosch VI 1842 (B).

12. **Chara fragilis** Desvaux in Lois. Not. Fl. Fr. 1810, p. 137.

Lit.: Prod. Fl. Bat. II, 2, 1853, p. 186; Mig. l.c. p. 722; Rob. l.c. p. 279; Hy l.c. p. 42; Groves II l.c. p. 61; Lakowitz Alg. Fl. Ostsee 1929, p. 203 — *Ill.:* Kg. Tab. Phyc. VII, 1857, p. 22, 23, T. 54, 55, 56; Mig. l.c. Fig. 146, 147.

Monoecious, polymorphic and variably high, usually 20—40 cm high, slightly incrusted. Stem rather slender and graceful, finely striped. Internodes equalling or exceeding the leaves. Regularly triplostichous, corticated, primary and secondary cells equally broad and prominent, never bearing spine-cells or papillae. Stipulodes irregularly developed, usually rudimentary. Leaves 6—9 in a whorl, fine and brittle. Segments 5—8 corticated; leaf-tip ecorticate (1—2 celled). Posterior bract-cells always wanting, anterior ones usually extant though short. Oogonia 500—700 μ (± 600 μ) long. Antheridia ± 250 μ in diam., brightly red with distinct markings on the shields.

Resembling *Ch. verrucosa,* however, *Ch. verrucosa* forms distinct tufts, the leaves are usually exceeding the length of the internodes and at least the upper row of stipulodes is well developed.

Distribution: Almost cosmopolitan species (not in W. Indies).

N. Holland: Amsterdam, LACOSTE (B) — S. Holland: Wassenaar, ditch in Persijnpan, STEKHOVEN 22 II 1933 (B, sterile).

Formae mikroptilae

Lit.: MIG. l.c. p. 729.

Bract-cells equalling or shorter than the ripe oogonium. Stipulodes hardly developed.

Friesland: Jorwerd, LAMBERS 11 VIII 1924 (U) — Utrecht: Driebergen, along railway — N. Holland: Amsterdam, ditches, LACOSTE (B); Sloten, Haarlemmermeerpolder, LACOSTE IX 1853 — S. Holland: Nieuwland near 's-Gravezande (KÜTZING: *Chara aspera*).

f. β **Hedwigii** (AG.) MIG. in BRUZELIUS Obs. Char., 1824, p. 7, 21.

Lit.: KG. Tab. Phyc. VII, 1857, p. 23; MIG. l.c. p. 730; GROVES II l.c. p. 64 — *Ill.:* KG. l.c. T. 55 I; GROVES II l.c. Pl. XLIII.

Very long stretched with extremely long leaves, strong form, the largest of *Ch. fragilis* (40—70 cm), pale soft green. Stem slack, not solid as usual for *Ch. fragilis* and therefore flat, when dried. Internodes 3—6 cm. Cortex normal. Stipulodes like terete papillae. Leaves 2—4 cm, 7 in a whorl, firm, at the lower and middle internodes widely patent, not curved. Bract-cells of sterile leaves not developed, of fertile leaves shorter than the oogonia.

Friesland: St. Jacobi Parochie, VAN HALL 15 VII 1829 (B) — Gelderland: Berkel near Boevenbrug, trench in hayfield, 13 VII 1859 (B, mixed up with *Chara vulgaris*); Ankelaar, KOK ANKERSMIT IX 1873 (B); Loo-Ankelaar, ditch, KOK ANKERSMIT IX 1873 (B, sterile); Apeldoorn, KOK ANKERSMIT 1873 (B, sterile); Apeldoorn, peatpits in Dalhoven, KOK ANKERSMIT 4 IX 1875 (B); Apeldoorn, peatpits on "de Beemte", KOK ANKERSMIT 4 IX 1875 (B) — N. Holland: Terschelling, HOLKEMA 27 VIII 1869; Osdorp near Amsterdam, brackish ditch, LACOSTE IX 1849 (L, B) — S. Holland: Waalsdorp, ditches in the dunes, VRIJDAG ZIJNEN (B, mixed up with *Chara vulgaris* L. *subinermis* A. BR. forma *normalis* (MIG.), BRAUN: *Chara fragilis* and *Chara foetida*).

Formae makroptilae

Lit.: MIG. l.c. p. 742.

All bract-cells exceeding the ripe oogonium. Upper stipulodes developed, the lower row hardly or not developed.

Friesland: Veenwouden, SPREE? 3 VIII 1851 (B), summer 1852 (B), 24 VII 1854 (B), ditch, 24 VII 1854 (B) — Groningen: ditches outside Groningen, STOLZ (B) — Gelderland: Epe, S. 1864 (B); Wissel, peatmoors, BOERLAGE 1890 (B); Lochem, pond in Sterrebosch, OUDEMANS VII 1875 (B); Nijkerk, peatmoor near Hoevelaken, STOLZ (L); Hoevelaken near Nijkerk, STOLZ 1870 (B) — Utrecht: Achttienhoven, BEINZ (B); pits in peat, BEINZ 1871 (B); LACOSTE (B, BRAUN: *Chara fragilis longibracteata* confirmis obsita); Maartensdijk, LACOSTE VI 1841 (L, KÜTZING: *Chara pulchella*); VAN DEN BOSCH (B, BRAUN: *Chara fragilis* var. *longibracteata* A. BRAUN); Jutphaas, VAN DER TRAPPEN? (L); Vinkeveen, LACOSTE V 1850 (L) — N. Holland: Vlieland, DE VRIES VIII 1937 (L); Halfweg near Haarlem, Herb. MOLKENBOER (B) — S. Holland: Boekhorst, pond, 29 VIII 1859 (L); Hazerswoude, Rietveldsche Polder, STEKHOVEN 9 IX 1833 (B, BRAUN: *Chara fragilis* var. *verrucosa longibracteata*); Hazerswoude (B, BRAUN: *Chara fragilis* var. *verrucosa longibracteata*); Leiden, DOZY (L) — N. Brabant: Eindhoven, ditches, Herb. FORSTEN (B, BRAUN: *Chara foetida*).

13. **Chara verrucosa** ITZIGSOHN in Bot. Zeit. 8, 1850, p. 338 — *Chara delicatula* AG. Syst. Alg. 1824, p. 130 (non DESV.).

Lit.: MIG. l.c. p. 752; ROB. l.c. p. 280; GROVES II l.c. p. 65 — *Ill.:* MIG. l.c. Fig. 148; GROVES II l.c. Pl. XLIV.

Monoecious, about 10 cm high, more concentrated than *Ch. fragilis*, forming tufts. Stem thin, hard and terete. Internodes shorter than the leaves. Cortex triplostichous; primary cortical cells wider than the secondary ones. Cortical node-cells sufficiently conspicuous, forming papillae. Stipulodes of the upper whorl well developed, those in the lower always shorter. Leaves 7—8 in a whorl, tall, stiffly straight, patent. Segments 8—9, 3-celled leaf-tip ecorticate; only the first two segments fertile. Anterior bract-cells hardly developed, posterior bract-cells not developed, or reduced to mere papillae. Oogonia 500—760 μ (± 600 μ) long. Antheridia ± 350 μ in diam.

To be distinguished from *Ch. fragilis* by the habitus, the internodes (shorter than the leaves), the cortex, the cortex-papillae, and the hardly extant bract-cells.

Distribution: Europe, Asia Minor, S. Africa, N. America.

Groningen: Noordlaren, HAVINGA 9 VII 1916 (G); Eelderweg, POSTMA 18 V 1905 (G) — N. Holland: Terschelling, Doodemanskisten, KOSTER n. 159 13 VII 1937 (L); Wisselsche veenen, U. I. (BOERLAGE) 1890 (B); Vinkeveen, Botsholsche plas, VAN DER WERFF 29 X 1937 (L).

MISCELLANEOUS NOTES ON LORANTHACEAE 16—18

by

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16. What is Viscum monilliforme Blume? (*Plate I*)

Blume published *Viscum monilliforme* first with a short diagnosis in his "Bijdragen tot de Flora van Nederlandsch Indië" 13 (1825) p. 667, and later he gave a figure of it in his "Flora Javae", plate 25 (1851?).

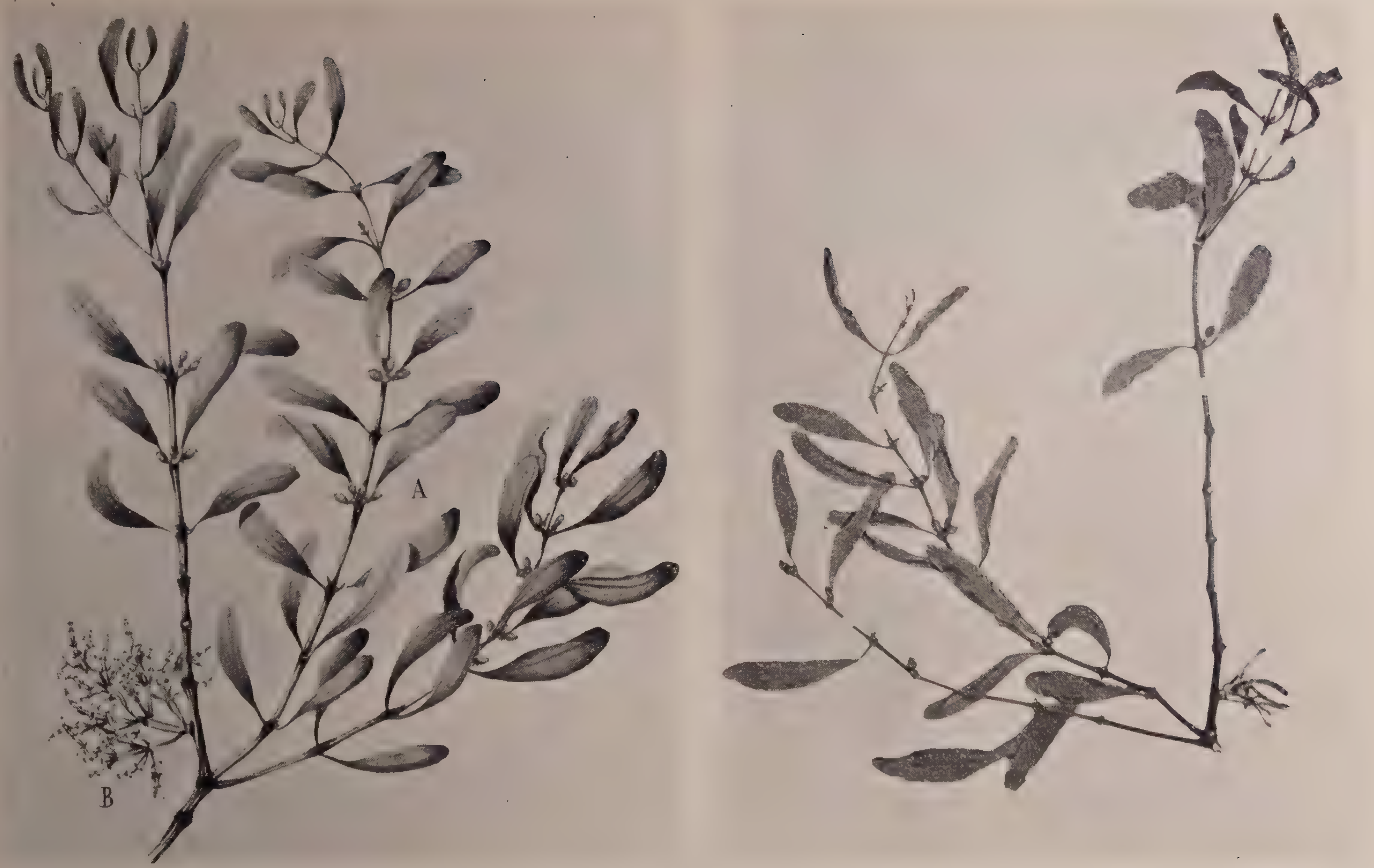
In the "Bijdragen" we read:

VISCUM MONILLIFORME, Bl. *V:* caule aphyllo inferne teretiusculo, ramulis articulatis ancipitibus, articulis nudis, floribus verticillatis sessilibus (aff. V. opuntioidi). *Crescit:* in arboribus circa Buitenzorg vulgatissimum. *Floret:* omni tempore. *Nomen:* Mangando.

As the *Loranthaceae* growing in the vicinity of Buitenzorg are very well-known, and Blume speaks of a very common species, and mentions no other leafless species, it is certain that the *Viscum monilliforme* of Blume's "Bijdragen" is the common *Viscum articulatum* Burman fil. The remark "aff. V. opuntioidi" alludes to his "Catalogus" of 1823, where, for the Buitenzorg Botanic Garden, he only mentions *Viscum orientale* and *V. opuntioides*, the former representing *Viscum ovalifolium* De Candolle, the latter undoubtedly *Viscum articulatum.*

On the above cited plate of the "Flora Javae", we, however, find, under the name *Viscum monilliforme*, not *Viscum articulatum*, but *Korthalsella opuntia* (Thunberg) Merrill. The plant, as well as the details, is unmistakable. It is a small specimen, figured as parasitic on *Viscum "orientale"* (recte: *V. ovalifolium* De Candolle).

It is impossible that Blume, in his "Bijdragen", could have meant *Korthalsella opuntia.* This has never been found in the vicinity of Buitenzorg, and very probably cannot grow there, as, in the tropics, it is a high mountain species, and in Java it has, hitherto, not been found below 1400 m altitude. Moreover, I found, during my four years' stay at Buitenzorg, often small plants of *Viscum articulatum* parasitic



On the left a photo of Plate 25 of the *Loranthaceae* in Blume's "Flora Javae", representing *"Viscum monilliforme"* parasitic on *"Viscum orientale"* (in reality *Korthalsella opuntia* on *Viscum ovalifolium*). On the right, a photo of the specimen in the Leiden National Herbarium, from which this plate was drawn, the small parasite actually being *Viscum articulatum*. (Photos by Jac. Veenhoff, Groningen.)

on *Viscum ovalifolium*, whereas, to my knowledge, *Korthalsella opuntia* has never been found parasitic on *Viscum*. Also the specimen of *Viscum monilliforme*, seen by me in the type-herbarium of DE CANDOLLE in Geneva, and which was collected in Java and sent to DE CANDOLLE by BLUME, is a small specimen of *Viscum articulatum*.

Whence this discordancy between the "Bijdragen" and the "Flora Javae"?

In 1937, I found, in the National Herbarium, Leiden, on sheet No. 908, 128—78, and inserted under *Viscum orientale*, the specimen from which, without doubt, the plate in question of the "Flora Javae" was drawn, representing *Viscum monilliforme* parasitic on *V. orientale*. (See the plate.) This plant, indeed, is *Viscum ovalifolium*, bearing as a parasite a small, mutilated plant of *Viscum articulatum*!

We can only guess in what way *Korthalsella opuntia* appeared on the plate in the "Flora Javae". I presume as follows.

The text of part 13 of the "Bijdragen" was published in 1825, and was probably written shortly before, when BLUME still lived at Buitenzorg. *Viscum articulatum*, so common there, had first been called by him *Viscum opuntioides* (see his "Catalogus"), and soon afterwards *Viscum monilliforme* (see his "Bijdragen"). The plate for the "Flora Javae" representing *Viscum articulatum*, and bearing the name *Viscum compressum* (plate 26), certainly was provided with this name much later, when BLUME already lived in Holland, and, according to a note on a herbarium label in the Leiden National Herbarium, written by MOLKENBOER, who wrote the *Loranthaceae* for MIQUEL's "Plantae Junghuhnianae", was not published before 1851. At that time, BLUME certainly had already come to the conclusion that the leafless *Viscum*, so common in the vicinity of Buitenzorg, was no new species, but had to be called *Viscum compressum*, and he must have restricted the name *Viscum monilliforme* to the small plants of this species found by him parasitic on *Viscum ovalifolium*. Perhaps, after so many years, he had no clear idea of these plants, and, wishing to publish a plate of them, he identified the one small mutilated specimen he had in his herbarium, with the similar small specimens of *Korthalsella opuntia* from Japan, also present in his herbarium; and to the draughtsman who had to draw the plate for the "Flora Javae" he furnished such a specimen of *Korthalsella opuntia* to replace the mutilated small specimen of *Viscum articulatum*.

It being certain, as I have already shown in the above, that the original *Viscum monilliforme* of the "Bijdragen" is nothing but *Viscum* *articulatum,* we must bear in mind that, in spite of the fact that the *Viscum monilliforme* of the "Flora Javae" is a *Korthalsella,* the specific epithet *monilliforme* can never have significance for the nomenclature of any *Korthalsella.*

17. New Clemens-numbers from Mt. Kinabalu, Borneo.

(Supplement to Note 7, in Rec. trav. bot. néerl., 31, p. 751—758, and Note 12, in Blumea, II, p. 39—42.)

Loxanthera loxanthera (DE CANDOLLE) DANSER — Penibukan, side ridge, 4000 ft el., 7 X 1933, CLEMENS 40613 (L), on the 220′ Sapot tree, flowers previously sent from this same shrub found under the Sapot, flowers pink.

Macrosolen flammeus DANSER — Gurulau Spur, 8000 ft el., low on stumpy shrub, 8 XII 1933, CLEMENS 50833 (L), flowers with red base, purplish neck, tip greenish yellow.

Macrosolen splendidus DANSER — Penibukan, jungle ridge, 3500 ft el., 27 IX 1933, CLEMENS 40747 (L); *ibidem,* 4000 ft el., 9 X 1933, CLEMENS 51697 (L), on large tree, flower red, white and bluish; *ibidem,* CLEMENS 40286 (L), flowers scarlet gray and dark gray.

Amyema Beccarii (VAN TIEGHEM) DANSER — Penibukan ridge, jungle ridge, 4000 ft el., X 1933, CLEMENS 40375A (L), on oak, flower pink; Dahobang River forest, 4000 ft el., 15 IX 1933, CLEMENS 40375 (L), shrub, flower red, calyx and segments green.

Helixanthera coccinea (JACK) DANSER — Penibukan, ridge above Dahobang, 3500 ft el., 1 IX 1933, CLEMENS 50045 (L), shrub, flower red; Gurulau spur, jungle crest, 5000 ft el., 26 XI 1933, CLEMENS 50510 (L), on 100′ tree, flower dark red.

Helixanthera spicata DANSER — Penibukan ridge, 5000 ft el., 7 XI 1933, CLEMENS 50226 (L), flower pinkish red, fruit dark purple (only fruits present).

Trithecanthera superba DANSER — Penibukan, jungle ridge, 4000 ft el., 18 X 1933, CLEMENS 40785 (L), on 80′ tree, fruit green, brown terminal.

Ginalloa arnottiana KORTHALS — Kinabalu foot hills, Bungal, 3000 ft el., 1 I 1934, CLEMENS 51299 (L), on 58 ft *Eugenia.*

Ginalloa nuda DANSER — Dabohang River ridge, near river, 3000 ft el., 27 IX 1933, CLEMENS 40483 (L), parasite on tree, flower cream, fruit green; Penibukan, W. ridge, 4500 ft el., 4 X 1933, CLEMENS 40483a (L), parasite on 60′ tree.

Completed description: Very slender, to 60 and more cm long, entirely glabrous, strongly branched, many times di-tri-chotomous, the branches spreading at their bases; young internodes very thin, terete, superficially grooved, usually 1.5—4 cm long, nearly 0.5 mm in diameter, slightly thickened towards the apex, the older ones more exactly cylindrical, slightly thickened at the nodes, the oldest ones less distinctly ribbed but somewhat rough, up to 3 mm in diameter. Pairs of leaves reduced to collars for the greater part, here and there, usually at the tips of branches, normally developed; normal leaves sessile, lanceolate, or somewhat ovate-lanceolate, or rarely somewhat spathulate, gradually attenuate towards the base and the subobtuse or rarely rounded apex, 2—5 cm long, 2—10 mm broad, nearly equal above and below, dull, with one or three longitudinal nerves visible, but usually indistinct; each pair of reduced leaves connate to a collar around the node, slightly visible as two short points especially when very young, the collar nearly 0.5 mm long, infundibuliformous. Inflorescences terminal on the tips of the branches and axillary, but very seldom in the axils of normal leaves, minute spikes of usually 2—4, rarely up to 6, internodes, and usually 1—2, rarely more, mm long, usually sessile, rarely short-peduncled, the pairs of bracts entirely connate to collars, the axils distinctly decussate, the collars 0.75—1 mm wide, the flowers single in the axils, apparently female. Female flower short-cylindrical in the very youth, its flowering stage indistinct, later developing to an ellipsoidal fruit, at last to 8 mm long, constricted below the persistent and somewhat enlarged, up to 0.5 mm long, short-ovate, connivate tepals; seed flattened, elliptical, nearly 7 mm long, 4 mm broad. (Description from the materials above mentioned, that of the seed taken from the original description in Rec. trav. bot. néerl., 31, p. 229.)

The arrangement of the flowers in the spike seems to differ from that found in the species with larger inflorescences, where we have spikes of decussate triads, with the middle flowers female, the lateral ones male. Perhaps there is more resemblance with the inflorescence of *Ginalloa linearis* DANSER, as described by RUTISHAUSER, in Berichte Schweizer. Botan. Gesellsch., 47 (1937) p. 17.

18. On a number of Loranthaceae from Eastern New Guinea.

Through the courtesy of the Directors of the Herbaria of the New York Botanical Garden (NY), the Botanical Museum at Berlin-Dahlem (BD), and the State Herbarium at Leiden (L), I had the opportunity to determine the *Loranthaceae* collected on three different expeditions in Eastern New Guinea, by Mr. L. J. BRASS in 1933 and 1934, the late C. E. CARR in 1935 and 1936, and Mrs. M. S. CLEMENS in 1935, 1936, and 1937. Four new species, collected by CARR, were already published elsewhere (Brittonia II, 2, 1936). Yet the further results justify a short publication, not only because of the five species, the two new varieties, and the section of a genus they offer new to science, but also for the many new data about the distribution of several little-known species.

I, 1. **Amylotheca papuana** DANSER, n. sp. — Subrobusta, omnis glabra. Internodia iuniora basi teretia vel paulum applanata, apicem versus ancipita, incrassata et valde dilatata, foliifera 6—8.5 cm longa, basi 3—4 mm diametro, nodis ad 12 mm latis. Folia sessilia, ovata, basi rotundata, apice obtusissima, 8—9 cm longa, 4—5 cm lata, tenuiter vel crassiuscule coriacea, supra lucidula, subtus opaca, utrinque nervatura omni distincta, costa facie inferiore basin versus crassissima. Inflorescentiae racemuli triadum 4 decussatarum subsessilium, floribus omnibus sessilibus, circum nodos foliiferos dense aggregati; axis circiter 2.5 mm longus, 1.75 mm latus, triadibus binis in apice insertis, binis prope basin; bracteae rotundatae obtusissimae, margine membranaceo saepe lacerato, calycum bases amplectentes, 1.5—2 mm longae. Calycis tubus subcylindricus, circiter 2 mm longus, 1 mm latus; limbus erectus, paulo latior, margine membranaceo saepe lacerato. Corolla statu alabastri adulti acute sexangula, angulis etiam prominentibus, ad 20 mm longa, basi circiter 1.5 mm, apicem versus circiter 1 mm lata, parte superiore antheras continente teres (non angulata). Cetera ignota.

Peculiar by the short and dense inflorescences, and the sessile leaves rounded at the base.

S. E. New Guinea, Isuarava, secondary forest on tree, c. 4500 ft alt., 10 II 1936, CARR 15502 (BD, L), parasite, flowers pale grayish olive, crimson inside, apex crimson.

I, 2. **Amylotheca triflora** (SPANOGHE) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 250.

Morobe, Yunzaing, forest, 4500 ft alt., 25 VI 1936, CLEMENS 3460 (BD), shrub, fruit lined or striped, on big *Calophyllum*; *ibidem*, 12 VIII 1936, CLEMENS 3847 (BD), shrub, large clump, flower red at base, yellow green corolla; Boridi, forest, 4800 ft alt., 10 IX 1935, CARR 13060 (BD, L), parasitic on trees, flowers red, base crimson; *ibidem*, 4200 ft alt., 8 IX 1935, CARR 13013 (L), flowers red with deep crimson base; *ibidem*, 4000 ft alt., 2 X 1935, CARR 14348 (BD, L), fruit green, striped darker; Isuarava, forest, on tree, 4500 ft alt., 4 II 1936, CARR 15166 (BD, L), parasite.

Var. **pedicellata** DANSER, nov. var. — Triadum flores laterales breve pedicellati.

Central Division, Laloki River, Rona, 450 m alt., 11 II 1933, BRASS 3622 (L, double from NY), one plant seen, parasitic on a gully forest tree, compact densely branched small shrub, leaves fleshy, grey-green, midrib visible on both sides, perianth purplish; Koitaki, 1500 ft alt., 28 IV 1935, CARR 12077 (DB, L, type), parasitic on a tree in the open, flowers pale pink with a crimson ring at the base; Rouna, hill forest, 1400 ft alt., 12 VII 1935, CARR 12836 (BD, L), fruit red.

Amylotheca triflora was known, hitherto, from only two collections in New Guinea, *viz.*, the plant collected by KLOSS on the Wollaston Expedition, and that collected by BECCARI in the Arfak Mountains, and on which VAN TIEGHEM based his *Decaisnina Beccarii.* This name I formerly, but wrongly, supposed to be a synonym of *Amylotheca parvifolia* DANSER. I now have examined the type in the Paris Herbarium, and this is the most common form of *Amylotheca triflora,* with the lateral flower of the triads sessile. We now know that *Amylotheca triflora* also occurs in Eastern New Guinea.

The numbers BRASS 3622 and CARR 12077 resemble each other so closely that they could have been collected from the same specimen. Both have the inflorescences short and slender (axis up to 12 mm long and 0.75 mm in diameter at the base), and with only few pairs of triads, the lateral flowers of which have distinct, though short, pedicels (less than 0.5 mm long); the flowers are very delicate. The former specimen has no well-developed flowers; CARR 12077 has the corollas and styles up to 28 mm long, the free portion of the filament to 5.5 mm, the anther to 1.5 mm long; the leaves are narrow, lanceolate, obtuse, partly very thick, rather hard, but for the rest show the common characters of those of the species. The last number, CARR 12836, is only very sparse material, but entirely agrees with the type of the variety. Perhaps these plants represent a new species, but as they have no outstanding characters, I provisorily prefer to accept them as a variety of *Amylotheca triflora.*

I, 3. **Amylotheca Versteegii** (LAUTERBACH) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 251, 247; XIV, p. 79.

Morobe, Yunzaing, on forest tree, 4000—5000 ft alt., 23 IV 1936, CLEMENS 2931 (BD), shrub, flower base red, apex yellow; Western Division, Oriomo River, Dagwa, 40 m alt., II—III 1934, BRASS 5966 (L, double from NY), common on trees of savannah and gallery forests, large parasitic shrub, leaves shining, yellowish underneath, flowers showy, perianth red in the lower part, green in the upper part, panicles secund; Veiya, sea level, 8 III 1935, CARR 11597 (BD, L), parasitic on trees, petals yellow with a scarlet base, apex yellow-green; Isuarava, 1 II 1936, CARR 15331 (L), parasite, fruit light green suffused dull red; Isuarava, secondary forest on tree, 4500 ft alt., 1 II 1936, CARR 15330 (BD, L), parasite, flowers bright yellow with orange-red base, petal lobes yellow-green; *ibidem*, 4000 ft alt., 17 II 1936, CARR 15617 (BD, L), parasite, fruit dark red.

The numbers BRASS 5966 and CARR 11597, 15330 and 15617, mainly agree with the common form of the species, that is spread not only all over New Guinea, but even as far as New Ireland and the Aru Islands, but they are peculiar by leaves with nearly the whole nervation distinct. The number CARR 15617 has unripe fruits, CARR 11597 only flower buds not yet adult, CARR 15330 probably adult flower buds, BRASS 5966 adult flower buds and open flowers, and the corollas and styles of these are longer than usual, *viz.*, 40—43 mm long. By this, and by the strong nervature of the leaves, the latter specimen comes near to the closely allied *Amylotheca longifolia* (KRAUSE) DANSER, but the lateral flowers of the triads are shortly pedicelled. I do not doubt but that the number FORBES 499, from the Sogeri Region, that, in my former revision, I included in *Amylotheca longifolia*, is the same form.

Var. **Clementium** DANSER, nov. var. — Robustior, omnis glabra. Ramuli foliiferi et floriferi internodiis ad basin quadriangulis vel rotundato-quadriangulis, apicem versus dilatatis et acutius quadriangulis, fere anguste alatis, lateribus planis vel cavis, plerumque 3—6 cm longis, basi 4—6 mm diametro, apice duplo vel triplo latioribus, internodiis vetustioribus gradatim magis teretibus, insertionibus foliorum tuberculatis. Folia opposita vel subopposita; petiolus plerumque 1—3 cm longus, basi 2.5—4 mm crassus, teres vel supra nonnihil applanatus, laminam versus supra late et leviter canaliculatus; lamina oblonga, 10—20 cm longa, 4.5—9 cm lata, basi breve in petiolum contracta, obtusa vel apicem obtusum versus breve acuminata, crassiuscule coriacea, faciebus valde diversis, superiore semilucida, inferiore opaca badiuscula, costa supra leviter, subtus valde prominente, nervis ceteris fere omnibus utrinque distinctis leviter prominentibus, margine plano vel subrevoluto. Inflorescentiae singulae in axillis foliorum vel gregatim in nodis defoliatis, axi 2—5 cm longo, parte inferiore 5—15 cm longa tantum nudus, basi 2—3.5 mm diametro, teres, apicem versus gradatim attenuatus, insertionibus triadum leviter incrassatis; pedicelli triadum decussati vel sparsi, valde secundi, teretes, circiter 4 mm longi 0.6 mm diametro;

pedicelli florum lateralium circiter 0.5 mm longi et crassi; bracteae ovato-oblongae, obtusae vel obtusiusculae, concavae, circiter 1.5 mm longae. Calycis tubus cylindricus vel leviter ellipsoides, 2.5—3 mm longus, 1—1.25 mm latus, limbus erectus vel patens, circiter 0.2 mm longus, integer vel irregulariter laceratus. Corolla statu alabastri adulti 35—40 mm longa, supra basin rotundatam 1.5—3 mm lata, dimidia parte inferiore gradatim attenuata, usque ad partem superiorem cylindricam antheras continentem acute 6-angula, apice obtusissima, postea usque ad circiter 5 mm supra basin divisa in lacinias 6 lineares obtusas nonnihil cucullatas, sub parte superiore 9—10 mm longa acute reflexas. Filamenti pars libera 2—3 mm longa, difficile distinguenda ab anthera 6—7 mm longa, angusta, acuta, loculis continuis. Stylus filiformis, rectus, corollae aequilongus, stigma versus vix attenuatus; stigma ellipsoides, styli apice vix crassius. Fructus immaturus ellipsoides, maximus 6 mm longus 4 mm diametro, calycis limbo persistente, disco plano, et styli parte basali brevi coronatus. (Description from all the specimens from the Sattelberg mentioned below.)

This *Amylotheca* belongs in the neighbourhood of *A. Versteegii* (LAUTERBACH) DANSER, *A. Hollrungii* (K. SCHUMANN) VAN TIEGHEM, *A. longifolia* (KRAUSE) DANSER, *A. salomonia* DANSER, and *A. angustifolia* VAN TIEGHEM, but comes nearest to *A. Versteegii,* differs, however, from this by the internodes, that are strongly quadriangular and dilated towards the apex, and the distinct nervation of the leaves. The latter character reminds *A. longifolia*; the peculiar quadriangular twigs are found in none of the species enumerated in the above, though *A. Hollrungii* sometimes has the young twigs slightly angular. I should have based a new species on this form, if I did not suspect all these species to be only varieties of one polymorphous species.

Morobe District, Sattelberg, margin of woods below cow-barn, 3000 ft alt., 1 X 1935, CLEMENS 289 (BD), shrub, base of flower deep red, above pale green, fruit green, red apex; *ibidem,* forest hill, 3500 ft alt., 8 X 1935, CLEMENS s.n. "supplement“ (BD), flower base red, upper half yellow, type of the variety; *ibidem,* tree on trail below church, 3000 ft alt., 23 X 1935, CLEMENS 563 (BD), shrub, fruit green with reddish apex; *ibidem,* parasite on 50′ tree (*Melia*) in front of grotto waterfall, 3000 ft alt., 5 XI 1935, CLEMENS 782 (BD), height of plant 10′, diameter breast height 4″, orange berry lost; Ogeramnang to Malang, 5000 ft alt., 17 XII 1936, CLEMENS 4724 (BD), flower yellow and red; Morobe, Ogeramnang, 5800 ft alt., 12 II 1937, CLEMENS 5385 (BD), flower red at base, yellow green upwards.

II, 1. **Dactyliophora verticillata** (SCHEFFER) VAN TIEGHEM — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 358; XIV, p. 87.

Boridi, secondary forest on trees, 3800 ft alt., 21 X 1935, CARR 14641 (BD), flowers red, tipped green ochre; Kanosia, sea level, 10 II 1935, CARR 11239 (BD, L), parasitic on No. 11237, flowers deep rose-red, yellowish towards the apex; *ibidem*, 4 III 1935, CARR 11577 (BD, L), parasitic on *Rhizophora* No. 11513, flowers bright rose-red in lower half, bright yellow in upper half.

The species was known, hitherto, only from Doré and Kofo, both not far from Manoekwari. The new materials show a greater variation. The first number does not belong with certainty to the species, as the flowers are only half developed and the nodes and inflorescences are rusty short-tomentose. The leaves of the other specimens are more often ovate and obtuse, the inflorescences are not, or not always, inserted on the runners, the filaments vary from 2 to 4 mm in length. The differences of *Dactyliophora Novae-Guineae* (BAILEY) DANSER and *D. sàlomonia* DANSER with *D. verticillata* now appear to be very unimportant.

III, 1. **Amyema artensis** (MONTROUSIER) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XIV, p. 89.

Morobe District, Sattelberg, margin of jungle, 3000 ft alt., XII 1935, CLEMENS 1331 (BD), flower orange-red; Kanosia, sea level, 5 IV 1935, CARR 11783 (BD, L), parasitic on tree, fruit dull red; Kanosia, 50 ft alt., 10 II 1935, CARR 11242 (BD, L), partial parasite, on trees in light forest, flowers orange-yellow, apex yellow-green.

Moreover I can add:

Saruwaged Mts., three days journey west of the Sattelberg, 1200 m alt., III 1913, KEYSSER s.n. (BD); in the accompanying cover I found an umbel ray and a few detached flowers of another species, probably *Amyema strongylophylla* (LAUTERBACH) DANSER.

This is the same species I formerly mentioned for New Guinea under the name *Amyema Bamleri* (K. SCHUMANN) DANSER; for the synonymy see l.c.

III, 2. **Amyema barbellata** (BLAKELY) DANSER — *Loranthus barbellatus* BLAKELY, in Proc. Roy. Soc. Queensl., 34, p. 27 (1922); *Loranthus obtusus* K. KRAUSE, in Bot. Jahrb., 57, 4 (1922) p. 465, 479; ENGLER & KRAUSE, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) p. 150; *Loranthus rigidiflorus* K. KRAUSE, in Bot. Jahrb., 57, 4 (1922) p. 480, ic. 2, A—C; *Amyema barbellata* & *A. rigidiflora* DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, X, 3 (1929) p. 294, 298; XI, 3—4 (1931) p. 324, 344;

in Verhand. Kon. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, XXIX, 6 (1933) p. 26, 33.

Morobe, Yunzaing, forest tree, 4000—5000 ft alt., 18 IV 1936, CLEMENS 2370 (BD) partly, flowers yellow and red; *ibidem*, 22 VI 1936, CLEMENS 3381A (BD), flower flame color, segments yellow to orange; 23 VI 1936, CLEMENS 3415 (BD), flower flame, segments yellow; Yoangen, mountain trail, forest hill, on big *Ficus*, 4000—5000 ft alt.? 18 VI 1936, CLEMENS 3381 (BD, L), shrub, flower segments yellow, pistil and base red flame; Ogeramnang, high forest, 6000 ft alt., 31 XII 1936, CLEMENS 4803 (BD); Ogeramnang, on mighty *Eugenia* by rivulet, below water supply, 5800 ft alt., 20 I 1937, CLEMENS 5115 (BD, L), shrub, flower bronze to red, yellow tinge; Rouna, 1300 ft alt., 26 V 1935; CARR 12338 (BD, L), parasitic on tree in open savannah land, flowers golden yellow with pinkish orange base.

Determining the above specimens with my own key (l.c., p. 320—322) and description, I must identify them with *Amyema barbellata*, but, accepting the tips of the petals as non-bearded, I see no differences with *A. rigidiflora*. Indeed, these two species are only slightly different. CARR's no. 12338 has corollas 22—24 mm long, with the tips of the petals bearded inside, and the calyces glabrous. Mrs. CLEMENS's plants have corollas 25—30 mm long, with petals bearded at the tip, and tomentose calyces. The plants from the Talaud Islands and New Guinea, formerly mentioned by me as *Amyema rigidiflora*, have corollas nearly 28 mm long, petals not bearded at the tip, and tomentose calyces. The plant described by BLAKELY as *Loranthus barbellata* has corollas 25 mm long, the petals bearded at the tips, and the calyces glabrous. I cannot discover more important diferences between them, and therefore prefer to take them all together as one species, and to consider *Amyema rigidiflora* as a synonym of *A. barbellata*. Perhaps I overlooked the bearded petals in *Amyema rigidiflora* formerly. The specific epithet *"barbellata"* probably is a few months older than *"rigidiflora"*.

III, 3. **Amyema cephalanthera** DANSER, in Brittonia, II, 2 (1936) p. 131, t. 1, a—c.

Western Division, Oriomo River, Wuroi, 30 m alt., I—III 1934, BRASS 6023 (L, double from NY, type), not uncommon, parasitic on savannah forest tree, of scandent habit, main branches closely appressed to trunk of host tree, flowers showy, perianth and style pink, stamens red.

III, 4. **Amyema clavipes** DANSER, in Brittonia, II, 2 (1936) p. 132, t. I, d.

Sarawaket, Camp Busu Tamunae, 30 I—1 II 1937, CLEMENS s.n. (BD, L); Central Division, Mt. Tafa, 2400 m alt., IV 1933, BRASS 4972 (L, double from NY, type), parasitic on a ridge crest forest tree, midrib and nerves slightly raised on upper surface, obscured beneath, petioles and leaf margins red, peduncles and perianth red, perianth darker at base; Main Range, N. W. of Gap, forest on tree, 8000 ft alt., 22 I 1936, CARR 15227 (BD, L), leaves suffused red with red margins, flowers and fruit red.

Perhaps a form of low elevations of *Amyema pachypus* (see below), differing from this by larger leaves, and more slender twigs and inflorescences.

III, 5. **Amyema corniculata** DANSER, in Brittonia, II, 2 (1936) p. 133, t. I, e—g.

Central Division, Wharton Range, Murray Pass, 2840 m alt., VI—IX 1933, BRASS 4564 & 4564a (L, double from NY, type), common, parasitic on forest trees, leaves soft and fleshy, perianth red.

III, 6. **Amyema finisterrae** (WARBURG) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 332.

Entirely glabrous. Twigs terete, slightly thickened at the nodes, the internodes usually 2—3 cm long, those bearing full-grown leaves 1.5—2.5 mm in diameter, the young ones dilated to 1.5 × the breadth at the apex, not thickened, the older ones moreover somewhat thickened. Leaves exactly opposite, the petioles difficultly to be distinguished from the laminae, usually 5—7 mm long, not swollen at the base, terete in the lower portion, flattened above and dilated towards the lamina; lamina roundish elliptical, or slightly obovate, or slightly ovate, 2—4 cm long, 1—2 cm broad, usually contracted into the petiole below the rounded or cuneate base, very obtuse to rounded at the apex, thin-coriaceous, different above and below, dull on both surfaces, greenish above, brownish or yellowish below, the basal portion of the midrib and of the strongeast lateral nerves visible above, nerveless for the rest. Flowers single or in pairs, rarely three together, in the leaf axils, each on a separate articulate pedicel bearing no bract at the articulation, and one bract (in one flower 2 bracts) at the tip; pedicel usually 6—8 mm long, somewhat above the middle or at two-thirds of the length strongly articulate, the lower portion terete, nearly 0.5 mm in diameter, rounded or slightly cupuliformous at the tip, sometimes somewhat longer at one side, the upper portion somewhat less thick at the base, gradually somewhat thicker the tip; bract with amplexicaulous base, ovate, subobtuse, nearly 1.5 mm long. Calyx tube campanulate-terete, nearly 3 mm long, 1.5 mm wide, limb somewhat infundibuliformous, or even spreading, nearly 0.5 mm long, entire or nearly so. Corolla in the state of full-grown bud usually 34—35 mm long, nearly 2.5—3 mm wide above the rounded base, slightly widened in the lower half, then again narrowed, nearly terete and 2 mm wide in the upper half, slightly thickened above the insertions of the filaments and at about 5—6 mm from the tip, subobtuse, later entirely divided into 4 petals, that are nearly 1.5 mm broad in the lower half, gradually narrowed to 1.25 mm in the upper half, bearing the filament at about 12 mm from the tip, above the insertion of the filament over nearly 3 mm at each side with a membranous inflexed margin 0.5 mm broad, above that part narrow-lanceolate, nearly 1.25 mm broad, thickish towards the acute tip, usually not reflexed, or reflexed in the narrowest part, or above the insertion of the stamen. Filament 5—7 mm long; anther 2.5—3 mm long, hardly broader than the filament, distinctly divided into 4 non-septate loculi, subobtuse or subacute. Style nearly 1 mm longer than the corolla, nearly equally thick from the base to 6 mm below the stigma, distinctly 4-angular in the lower portion, terete in the upper portion; stigma nearly globose or obovate, several times thicker than the stype tip, nearly 0.3 mm in diameter. Fruit (unripe) obovate or pear-shaped, the largest ones up to 6 mm long, 3.5 mm in diameter, crowned by the slightly enlarged, up to 1 mm long, slightly infundibuliformous calyx limb.

This description is made from the specimens collected by Mrs. CLEMENS, under the no. 4544. They are somewhat more robust than all specimens formerly collected, their leaves are more roundish and especially less obovate, the inflorescences and flowers are a trifle larger, the corollas 32—35 mm long. The peculiar inflexed membranous margin was not observed by me formerly. The under mentioned specimens, collected by CARR, have much more cuneate leaves and have smaller inflorescences; flowers are lacking. They agree more closely with the specimens HELLWIG 322 and KLOSS s.n. formerly described by me.

Morobe, Ogeramnang, on forest tree below village, 5700 ft alt., 7 XII 1936, CLEMENS 4544 (BD), plant pendulous, flower red, stamens yellow; Alola, forest, 6000 ft alt., 17 XII 1935, CARR 13851 (BD, L), flowers crimson; *ibidem,* 2 I 1936, CARR 14143 (BD, L), parasite, flowers rose-red.

Known, hitherto, from only one locality in S. W. New Guinea, and one locality in N. E. New Guinea.

III, 7. **Amyema friesiana** (K. SCHUMANN) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 332.

Morobe, Yunzaing, forest tree, 5000 ft alt., 29 VI 1936, CLEMENS 3455 (BD), shrub, flower with red base, yellow apex, fruit red; *ibidem,* 5900 ft alt., 27 I 1937, CLEMENS 5156 (BD), petioles and peduncles purple-maroon, buds fawn yellowish; Central Division, Mafulu, 1250 m alt., IX—XI 1933, BRASS 5242 (L), parasitic in secondary forests, lower part of perianth red, upper red; and BRASS 5275 (L), parasitic on oak forests, leaf nerves prominent on upper surface, base of perianth red, upper part yellow; Isuarava, forest on tree, 5000 ft alt., 15 II 1936, CARR 15558 (BD, L); *ibidem,* secondary forest on tree, 3500 ft alt., 26 II 1936, CARR 15778 (BD, L), parasite, flowers red tipped yellow, petal lobes yellow green.

Known from several localities in northern New Guinea, new to S. E. New Guinea.

III, 8. **Amyema gracilis** DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 3—4 (1931) p. 334, ic. 9, z—aa.

Morobe, Yunzaing, 4493 ft alt., 16 IX 1936, CLEMENS 4194 (BD), flower all red, bud tips faint yellow.

This species was collected only once before, in western New Guinea, at nearly the same altitude. Perhaps it is only a variety of *Amyema artensis.* See also *Amyema papuana,* below.

III, 9. **Amyema pachypus** (BURKILL) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 341.

Central Division, Mt. Albert Edward, 3500 m alt., V—VII 1933, BRASS 4378 (L, double from NY), parasitic shrub on river bank tree, leaves yellow-green, inflorescence bright red, past flowering and perianths not seen.

Amyema pachypus was only known, hitherto, from Mt. Scratchley, were it was collected at an elevation of 3000—3900 m by GIULIANETTI (s.n.). The present specimen slightly differs from the type by somewhat smaller and thicker leaves, and few mm shorter peduncles, pedicels, and flowers, by which, still more than the type, it appears to be a form of high mountain summits. I think it possible, that *Amyema clavipes* (see above) may be a form of *A. pachypus* of lower elevations.

III, 10. **Amyema papuana** DANSER, nov. spec. — Fig. 1, c—d. — Omnis glabra. Ramuli teretes nodis incrassatis; internodia 1.4—4.5 cm longa, foliifera 1—3 mm diametro, iuvenilia nodis ad duplo dilatatis, vetustiora nodis incrassatis, cortice rimulis lenticellisque aspero. Folia opposita subsessilia, ovato-oblonga vel ovato-lanceolata, 3—8 cm longa,

1.5—2.5 cm lata, basi cuneata, in partem petioliformem 1—2 mm longam breviter contracta, apicem obtusiusculum versus acuta vel leviter acuminata, tenuiter vel crassiuscule coriacea, utrinque opaca, faciebus diversis, costa facie superiore nonnihil magis prominente quam inferiore (sic!), nervis ceteris fere invisibilibus. Inflorescentiae plerumque singulae in axillis foliorum, umbellae biradiatae triadum, quarum flores medii sessiles, laterales pedicellati; pedunculus teres, 5—6 mm longus, 0.75—1.25 mm diametro, apice basique nonnihil incrassatus; radii 2, divergentes (nec divaricati), 2—3 mm longi, pedunculo paulo tenuiores; pedicelli florum lateralium 1 mm longi vel paulo breviores, etiam divergentes; bracteae triangulares, fere uncinatae, circiter 1.5 mm longae, paulo minus latae. Calycis tubus campanulato-obovatus, 2 mm longus, 1.25—1.5 mm latus; limbus erectus vel nonnihil inflexus, 0.25—0.5 mm longus, integer vel nonnihil irregulariter dentatus. Corolla statu alabastri adulti gracillima, stylo subaequilonga, 0.5—0.75 mm lata, partibus basali et apicali vix incrassata, obtusiuscula, post divisa in petala 5. Stylus tenuiter filiformis, 32—35 mm longus, stigmate ellipsiode, circiter sesquiplo crassiore. Flos apertus et fructus ignoti.

Very closely allied to *Amyema gracilis,* and perhaps, like this, only a variety of the polymorphous *Amyema artensis.* In general appearance it comes near to the southern forms of this species, with smaller leaves and shorter flowers, but the flowers of *Amyema papuana* are still longer than those of the northern form of *A. artensis.* (Cfr. Bull. Jard. Bot. Buitenzorg, ser. 3, XIV, p. 89—91.) *A. panuana* differs from *A. gracilis* by 5-merous flowers, with glabrous calyces, and by narrower and more ovate leaves.

Central Division, east of Mt. Tafa, 2300 m alt., 27 V 1933, BRASS 4095 (L, double of NY, type), parasitic on a small bush in mossy forest, leaves thick and shining, pale beneath, flowers red, shaded to reddish yellow at tip; Alola, forest on tree, 6000 ft alt., 2 I 1936, CARR 14135 (BD, L), leaves with red margins, flowers rose-red, tipped ochre.

III, 11. **Amyema rhopalanthes** DANSER, in Brittonia, II, 2 (1936) p. 134, t. I, h.

Western Division, Oriomo River, Wuroi, 5 m alt., I—III 1934, BRASS 5782 (L, double from NY, type), parasitic on a riverland tree, uncommon, large straggling shrub, leaves yellowish, flowers red.

III, 12. **Amyema seemeniana** (K. SCHUMANN) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 345.

Morobe, Yunzaing vicinity, forest tree, 4000 ft alt., 8 VI 1936, CLEMENS 3235 (BD), shrub, large, luxuriant, flower bright pink.

Differs from the specimens from the shore near Hatzfeldhafen, formerly included by me in this species, by the calyx limbs not at all or hardly infundibuliformous, and by this peculiarity shows some approach towards the closely allied *Amyema squarrosa* (K. KRAUSE) DANSER.

III, 13. **Amyema verticillifolia** (K. KRAUSE) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 354.

Morobe, Ogeramnang, Kudose Seggele, 6000 ft alt., 11 I 1937, CLEMENS 4996 (BD), flowers beautiful, pink; Central Division, Mt. Tafa, parasitic on mossy forest tree, 2300 m alt., V—IX 1933, BRASS 4125 (L, double from NY), stem appressed to supporting tree trunk and climbing upon it for over 1 m, leaves few, flowers red on stem of old branches; Lala River, 6000 ft alt., 30 XII 1935, CARR 14100 (BD, L), climber, buds deep rose-red.

The species was already known from several localities in northern New Guinea, but is new to Papua. It is most closely allied to *Amyema scandens* (VAN TIEGHEM) DANSER (cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XIV, p. 92). Its fruit was not yet described. In the above mentioned specimens it is obovate, up to 9 mm long by 6 mm in diameter, moreover crowned by the persistent calyx limb that is erect, entire, nearly 2 mm high, 1.5 mm wide. The styles of Mrs. CLEMENS's specimen are unusually long, varying from 25 to 33 mm in length; moreover this specimen bears inflorescences on the runners.

Amyema, indeterminable for lack of flowers.

Alola, forest at 6000 ft alt., 17 XII 1935, CARR 13848 (BD), climber; *ibidem,* 31 XII 1935, CARR 14106 (BD, L), parasite, flowers rose-red in the lower half, ochre above; *ibidem,* 5 I 1936, CARR 14190 (BD, L) parasite, leaves edged crimson and suffused dull red above, inflorescence crimson, flowers rose-red; Boridi, forest, 5000 ft alt., 14 IX 1935, CARR 13150 (BD, L), young fruit yellow-brown; *ibidem,* 21 IX 1935, CARR 13298 (BD, L), fruit and stem tinted red.

IV, 1. **Distrianthes Lamii** (K. KRAUSE) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 366.

Morobe District, Sattelberg, parasite on tree, 3000 ft alt., 8 XI 1935, CLEMENS 819 (L), 819a (BD), shrub, flowers bright red; Sattelberg to Quembung, forest, 3000—3500 ft alt., 26 XI 1935, CLEMENS suppl. (BD), flowers under forest tree.

This species was only known from a much more western locality, *viz.,* the borders of the Doorman River, at 200 m alt.; the specimens from the Sattelberg differ from the type materials by somewhat more obtuse leaves, of which the smaller ones are even roundish and none acuminate, and by the more strongly hairy flowers with the calyx densely and long-hairy, and the corolla entirely stellate-hairy outside, more densely towards the base, more sparingly towards the tip. These differences cause an approachment towards the closely allied *Distrianthes molliflora* (K. KRAUSE) DANSER, which, perhaps, represents another variety of the same species.

The rather abundent materials collected by Mrs. CLEMENS allow me to give some complementary notes on the structure of the inflorescence and flower.

Inside the two large bracts, there are 4 smaller bracteoles, probably inserted at the base of the lateral flowers of the triads; these bracteoles are equal, narrow-triangular, nearly 3.5 mm long, 0.5 mm broad at the base,, with a dense and rather long sericeous indument outside, and rather acute. Calyx nearly 3 mm long, campanulate, somewhat laterally flattened by pressure, 1.5 by 2 mm wide, its limb very short, apparently longer by the long-hairy indument that covers the whole outside, the separate hairs nearly 1 mm long, simple; corolla rather densely stellate-hairy over its whole length.

V, 1. **Tetradyas perfoliata** DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 3—4 (1931) p. 362.

Lala River, forest on tree, 5000 ft alt., 26 XII 1935, CARR 14027 (BD, L), parasite, flowers pale flesh with darker nerves.

Though on Mrs. CLEMENS's label the flower colour is indicated, there are no flowers or inflorescences at all on the poor twigs in the Berlin and Leiden Herbaria. Yet I do not hesitate to identify these specimens with the species formerly described by me from the Sogeri region, on the ground of the peculiar leaves and internodes.

VI, 1. **Sogerianthe ferruginea** DANSER, n.sp. — Fig. 1, a—b. — Gracilis, ramulis teretibus, simplicibus vel dichotomis vel etiam umbellatim ramosis, internodiis foliiferis 3—13 cm longis, 2—4 mm diametro, nodis iuventute nonnihil applanatis et tumidis, postea magis incrassatis, ad duplo crassioribus. Folia opposita; petiolus difficile a lamina distinguendus, parte alata excluso 1—3 mm, parte alata incluso 5—8 mm longus, supra basin tumidam semiteres, laminam versus planior et latior; lamina ovato-oblonga, 9—16 cm longa, 4—7 cm lata, saepe falcata, sub basi rotundata vel cuneata subabrupte in petiolum contracta, apicem subacutum versus acuminata, crassiuscule chartacea, faciebus valde diversis, utrinque opaca, nervatura pennata sed nervis lateralibus utrinque 2 vel 3 valde incurvatis subcurvinervis, costa et nervis cras-

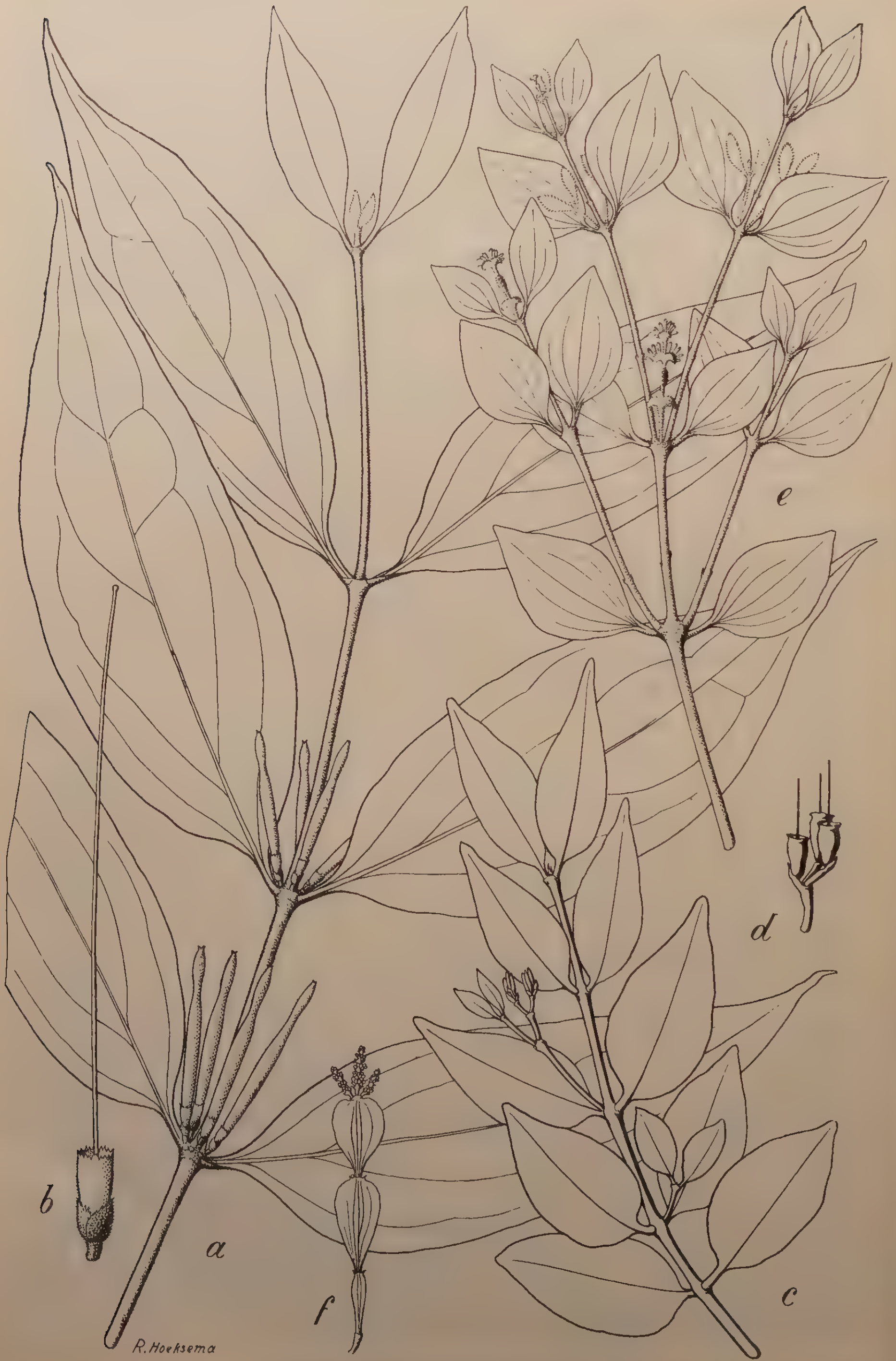


Fig. 1. (See page 47, bottom.)

sioribus facie superiore planis vel leviter prominentibus, venis vix visibilibus; folia (ut caules) iuventute densissime tomentosa indumento ferrugineo pilis divaricatis ramosis, facie superiore (ut caules) mox glabrescentia, facie inferiore indumento tenuescente sed semper denso obscure ferrugineo. Flores numerosi circum nodos, singuli in singulis scrobiculis corticis inserti; pedicellus nonnihil obconicus, circiter 0.5—1.5 mm longus, apice 1—1.5 mm lato bracteas 2 calycis basin includentes (exteriore quarum interiorem amplectente), rotundatas acutiusculas, 2—3 mm longas, facie exteriore ferrugineo-tomentosas, margine pilis ramosis fimbriatas ferens. Calycis tubus campanulato-infundibuliformis, circiter 2—2.5 mm longus, apice 1.25—1.5 mm latus, omnino dense ferrugineo-tomentosus; limbus erectus integer, 1.5—2.75 mm longus, ferrugineo-tomentosus ut tubus, fimbriatus ut bracteae. Corolla statu albastri adulti 28—38 mm longa, a basi ad medium ad 4 mm dilatata, apicem versus abruptius in collum attenuata, denique incrassata in clavam circiter 7 mm longam 1.5—2.5 mm crassam, acutam vel acuminatam, postea divisa usque ad maximam amplitudinem in lacinias 6 parte inferiore anguste triangulas parte superiore angustissime spathulatas, parte angustissima recurvatas, apicem acutum versus crassiusculas, tubo intus circiter 4 mm supra basin squamulis 6 breve lingulatis inflexis. Filamentum c. 4.5 mm longum; anthera c. 2.5 mm longa, acutiuscula, loculis non septatis. Stylus strictus, subfiliformis, a basi usque fere ad apicem aequicrassus, 29—39 mm longus, 6-costatus, parte apicali c. 3 mm longa paulum attenuatus, subteres; stigma subglobosum, styli parte inferiore aequicrassum. Fructus obovato-globosus, ad 5.5 mm longus, 4.5 mm diametro, calycis limbo persistente erecto subinfundibuliformi coronatus. (Description from all the materials under mentioned, the plate being drawn from CARR's no. 13917, before the more complete materials collected by Mrs. CLEMENS were received.)

Closely allied to *Sogerianthe sessiliflora* DANSER (cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 346), but different by several minor characters, such as the ferrugineous rather copious indument.

Morobe, Ogeramnang to Malang, hill trail, on medium tree, 4500 ft alt., 17 XII 1936, CLEMENS 4646 (BD), type of the species, shrub, ample

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Fig. 1, a—b: *Sogerianthe ferruginea* (CARR 13917), *a*: flowering twig, × $^2/_3$ *b*: pedicel with bracts, calyx, and style, × 2; *c—d*: *Amyema papuana*, *c*: leafy twig with inflorescence in bud (CARR 14135), × $^2/_3$; *d*: triad with 3 calyces (BRASS 4095), × 2; *e*: *Notothixos papuanus* (CARR 15403), × $^2/_3$; *f*: *Korthalsella papuana* (CARR 15120), × $^2/_3$.

big clump, flower red, tip yellow; Morobe, Bulung River vicinity, on forest tree, 3000 ft alt., 28 I 1937, CLEMENS 5184 (BD), fruit orange; Yodda River, forest on tree, c. 4500 ft alt., 21 XII 1935, CARR 13917 (BD, L), parasite, flowers deep pink.

VI, 2. **Sogerianthe sogerensis** (SP. MOORE) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 346; XIV, p. 95.

Koitaki, on a tree in wood, 1500 ft alt., 19 IV 1935, CARR 11940 (BD, L), fruit green suffused with red; *ibidem*, 7 VI 1935, CARR 12574 (BD, L), flowers orange; Alola, forest, on No. 13832, 5000 ft alt., 17 XII 1935, CARR 13831 (BD, L), parasite, flower pink, petal lobes with broad crimson margins; Boridi, secondary forest, on trees, 3800 ft alt., 21 X 1935, CARR 14640 (BD, L), parasite, flowers deep rose-red; Boridi, forest, on tree, 4000 ft alt., 7 IX 1935, CARR 14833 (BD, L), flowers deep rose-red, petal lobes cream with rose-red margins; Uniri River, forest, on a tree, 6500 ft alt., 18 I 1936, CARR 15192 (BD, L), parasite, flowers rose-red.

The species is, besides from S. E. New Guinea, only known from New Ireland.

VII, 1. **Dendrophthoë falcata** (LINN. FIL.) ETTINGSHAUSEN — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 403; XIV, p. 96.

Kanosia, on forest tree, 50 ft alt., 14 II 1935, CARR 11359 (BD, L), parasite, flowers deep creamy yellow, petal lobes dark crimson.

Widely spread from India to the Solomon Islands and Tropical Australia, but CARR's plant is the first recorded for S. E. New Guinea.

VII, 2. **Dendrophthoë Gjellerupii** (LAUTERBACH) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 409, ic. 21, d—f.

Morobe District, Wareo, high forest, hill trail, 2500 ft alt., 7 II 1936, CLEMENS s.n. (BD), flower all red, on ground, fruit not seen, no leaf; Yunzaing, Mt. Aloki, 4000—5000 ft alt., 21 IV 1936, CLEMENS 2389 (BD), shrub, flower red; Central Division, Kubuna, parasitic in rain forest, 100 m alt., XI 1933, BRASS 5645 (L, double from NY), flowers pale yellow; Rouna, parasitic on trees in open savannah land, 1300 ft alt., 29 V 1936, CARR 12428 (BD), flowers pale reddish outside, bright red inside; Isuarava, secondary forest on tree, 4000 ft alt., 7 II 1936, CARR 15447 (BD, L), parasite, flowers red, petal lobes ochreous with green base.

BRASS's No. 5645 is the same form as that collected by the same collector formerly near Budatobara (BRASS 746, see l.c. p. 410), but the corollas are a trifle longer, *viz.* up to 20 mm. CARR's no. 15447 has corollas still a few mm longer, *viz.* 20—24 mm long; CARR's no.

12428, from Rouna, is somewhat doubtful, as there are neither corollas nor styles, but the calyces appear too small for *Dendrophthoë falcata*. Mrs. Clemens's collection from Wareo only consists of flowers picked up from the ground, partly with corollas and styles varying from 20 to 26 mm in length; her no. 2389, from Yunzaing, has the longest flowers ever seen by me in this species, the styles measuring up to 28 mm. Though a variation of the corolla length from 14 to 28 mm is quite normal for a *Dendrophthoë* species, it must be borne in mind that the corolla length of *Dendrophthoë falcata* varies from 30 to 50 mm, and sometimes is found even a few mm shorter, so that, in this respect, there is almost a transition series between *D. falcata* and *D. Gjellerupii*, just as is the case between *D. falcata* and *D. pentandra*, and between *D. falcata* and *D. praelonga*. Perhaps in *D. Gjellerupii* there is a relation between the length of the corolla and the altitude of the locality, which appears from the following:

Gjellerup 143	style up to 14 mm long	1 m alt.
Brass 746	style up to 16 mm long	150 m alt.
Brass 5645	style up to 20 mm long	100 m alt.
Carr 15447	style up to 24 mm long	1200 m alt.
Clemens s.n.	style up to 26 mm long	750 m alt.
Clemens 2389	style up to 28 mm long	1200—1500 m alt.

Dendrophthoë, indeterminable for lack of flowers.

Morobe District, Quembung Mission, 2500 ft alt., forest hill, on flowering Gordonia, 11 XII 1935, Clemens 1275 (BD), great size, almost tree-like, fruit gray-green; Yunzaing, hill, on forest tree, 4000—5000 ft alt., 18 IV 1936, Clemens 2370 (BD) partly, shrub, flower yellow and red.

VIII, 1. **Korthalsella papuana** Danser, n. sp. — Fig. 1, f. — Caulis simplex, erectus, 2—6 cm longus, internodiis paucis (plerumque 4), inferiore subtereti brevi, ceteris subaequilongis gradatim magis eodem sensu applanatis, superiore obovato vel subobcordato, 15—19 mm longo, 10—13 mm lato, basi acuminato, apice subtruncato. Folia ad bracteas reducta, bina connata in limbum ad axillas acutum 0.5—0.75 mm longum, inter axillas obtusum circiter 0.5 mm longum, utrinque nervis longitudinalibus 3 vel 5, quorum medianus costatus, laterales minus distincti. Inflorescentiae ternae in apice caulis, spicatae, 7—15 mm longae, forsan postea etiam in axillis inferioribus; internodia 4—6, subteretia, limbo patente circiter 1.25 mm diametro, axillis distincte decussatis; pili interflorales numerosi, limbum fere 1 mm superantes, conferti. Flores in quoque limbo numerosi verticillati pluriseriales, conferti, ut videtur fere omnes feminei, clavati, trimeres.

Closely allied to *Korthalsella geminata* (KORTHALS) ENGLER, from which I hesitate to separate it as a species. The most important differences are in the broader and more attenuate internodes. Perhaps the unbranched stems and the ternate apical inflorescences may not be found in older and more strongly developed specimens.

Crest of Main Range, N.W. of the Gap, ridge top, 9500 ft alt., 15 I 1936, CARR 15120 (BD, L), parasite on shrubs.

The genus is new to New Guinea.

IX, 1. **Ginalloa arnottiana** KORTHALS — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 3—4 (1931) p. 449; Philipp. Journ. Sc., 58, 1 (1935) p. 130.

Morobe, Bulung River, 2878 ft alt., 9 II 1937, CLEMENS 5339 (BD), on small tree, fruit ivory white.

The genus is new to New Guinea. The above plant appears to represent a white-fruited variety, as, hitherto, I always found the fruits of *Ginalloa* described as red on herbarium labels.

X, 1. **Notothixos cornifolius** OLIVER, in Journ. Linn. Soc., bot., 7 (1864) p. 92, 103, cum var. *angustifolia*; BENTHAM, Fl. austr., 3 (1866) p. 397; BAILEY, Synops. Queensl. Fl. (1883) p. 452, excl. var. *subaureo*; ENGLER, in ENGL. & PR., Nat. Pflanzenfam., III, 1, p. 193 (1889); VAN TIEGHEM, in Bull. Soc. Bot. Fr., 43 (1896) p. 187; ENGLER, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. (1897) p. 139; BAILEY, Compr. Cat. Queensl. Pl. (1913) p. 469; BLAKELY, in Proc. Roy. Soc. N. S. Wales, 53, 2 (1928) p. 40, t. IV, 11—22, cum var. *angustifolia*; ENGLER & KRAUSE, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) p. 196; *Notothixos xantophyllus* VAN TIEGHEM, in Bull. Soc. Bot. Fr., 43 (1896) p. 187, nomen; ENGLER & KRAUSE, Nat. Pflanzenfam., ed. 2, 16b (1935) p. 196, nomen.

Tomentum on all very young parts thin but very dense, gradually disappearing from the twigs and the leaves before they are adult, persistent on the inflorescences, but growing less dense on the fruits, first ochraceous or light-ferrugineous, soon more grey-greenish. Small shrub, the oldest internodes up to 8 cm long, 5 mm in diameter, terete, dilated at the nodes to 1.5 × as broad, the brownish-green surface rough by minute light-coloured crevices, pseudotrichotomous at nearly all the nodes in the non-flowering portion, the internodes less thick and shorter towards the extremities, the youngest ones less than 1 mm in diameter, terete, striped, up to 1.5 × as broad at the tip, 3—5 cm long, pseudo dichotomous at nearly all the nodes below the terminal inflorescences, each branch with only two normal leaves at the apex and (probably always) two scale-like rudimentary leaves at the base and two others a few mm above the base, the latter ones narrow-triangular, acute. Normal leaves opposite; petiole difficulty to be distinguished from the lamina, the non-dilated portion up to 6 mm long in the largest leaves, flattened above and beneath; lamina ovate-lanceolate, usually somewhat falcate, 5—11 cm long, 7—15 mm broad, broadest at one-third of the length, gradually attenuate and somewhat acuminate towards the base and the apex, subobtuse, rather thick-coriaceous, brittle, dull on both sides, greyish green, with usually 3 longitudinal distinct slightly prominent nerves, sometimes with 2 short longitudinal nerves more. Inflorescences terminal on the thinner internodes, 1—6 cm long, racemes of fan-like cymes, one cyme terminal and 5 or less decussate pairs of such cymes lateral; peduncles 3—9 mm long, 0.75 mm in diameter, the upper ones gradually somewhat shorter; pedicels of the cymes usually 3—4 mm long; bracts at the base of the pedicels spreading, acute-triangular, 0.5—1 mm long, those of the cymes of the same shape, a little shorter. Flowers usually 5 in each cyme; arrangement of the female and male flowers not evident, most of the flowers apparently female, soon forming fruits. Fruits ovate-oblong, up to 6 mm long, 3.5 mm in diameter, crowned by the 4 persistent tepals; seed oblong, very flat, white, 4 mm long, 2.5 mm broad, 0.5 mm thick. (Description from the under metioned specimens.)

Closely allied to *Notothixos leiophyllus*, and entirely agreeing with it in structure of the inflorescences, but with a less copious and shorter indument, the leaves thicker and nearly equal above and below, and falcate. I have determined our plant with BLAKELY's revision of the Australian species (l.c.). The only difference with the plants, described by BLAKELY as *N. cornifolius*, is that the leaves are much narrower, and it is, therefore, possible that our plants represent the var. *angustifolia* OLIVER, published without description.

Lala River, in forest on tree, 5500 ft alt., 20 XII 1935, CARR 13904 (BD, L), leaves glaucous, flowers glaucous with the petal lobes brown inside.

The species was only known, hitherto, from the Australian Continent (Queensland, N. S. Wales, cfr. BLAKELY, l.c., p. 40), and is new to New Guinea.

X, 2. **Notothixos leiophyllus** K. SCHUMANN — Cfr. Bull. Jard. Bot.

Buitenzorg, sér. 3, XI, p. 456; Journ. Arnold Arboret., 16, p. 209; Phil. Journ. Sc., 58, p. 138.

Central Division, Laloki River, Rona, 600 m alt., 16 III 1933, BRASS 3681 (L, double from NY), parasitic on forest trees, common, indumentum golden yellow on young shoots and inflorescences, pale brown under leaves, upper sides of leaves shining, under sides darker and dull, fruit soft whitish, 5 mm in diameter; Central Division, Ononge Road, Dieni, 29 IV 1933, BRASS 3910 (L, double from NY), parasitic on a tall rain forest tree, young shoots, flowers, and fruit golden yellow; Boridi, forest on trees, 3500 ft alt., 22 X 1935, CARR 14703 (BD, L), parasite, flowers yellow.

Notothixos subaureus OLIVER was incidentally mentioned by F. v. MUELLER for S. E. New Guinea, in Proc. Linn. Soc. N. S. Wales, ser. 2, II (1887) p. 422, and, according to BLAKELY, also in Descript. Not. Pap. Pl., 1885, p. 61. The last specimens, however, represent, according to BLAKELY, *Notothixos leiophyllus*, from the Owen Stanley Range, coll. H. C. FORBES, and therefore it is quite possible that the first record, too, is erroneous.

X, 3. **Notothixos papuanus** DANSER, n. sp. — Fig. 1, e. — Indumentum tomentosum, densum in omnibus partibus iuvenilibus, e pilis verticillatim ramosis longioribus et brevioribus compositum, primum ochraceum, postea magis canum. Frutex parvus; rami vetustiores teretes, valde pseudo-trichotome ramosi, internodiis ad 4 cm longis, 5 mm diametro, nodis incrassatis ad duplo dilatatis, superficie atra et aspera, striata; ramificationes extremae tenues, pseudo-dichotomae (inflorescentiis in bifurcationibus positis), internodiis minus quam 1 mm diametro et 2 cm longis, minus dilatatis, nec incrassatis. Folia opposita; petiolus difficile a lamina distinguendus, 2—5 mm longus, basi non incrassatus, 0.5—1 mm latus, dorsiventraliter applanatus, laminam versus magis dilatatus magisque applanatus; lamina ovata, 1.75—4.5 cm longa, 1—2.8 cm lata, obtusa, sub basi cuneata in petiolum contracta, tenuiter coriacea, fragilis, facie superiore (statu sicco) atra, opaca vel nonnihil lucida, facie inferiore indumento opaca, denique subcana, nervis 3 vel 5 longitudinalibus facie superiore impressis, plerumque visibilibus sed indistinctis, facie inferiore vix visibilibus. Inflorescentiae terminales in ramulis tenuioribus, spicatae, ad 2 cm longae, e cymis 3 vel 4, rarius paucioribus, ventilabriformibus, decussatim superpositis, compositae; pedunculus ad 5 mm longus, basi teres et minus quam 0.5 mm diametro, apicem versus vix applanatus et dilatatus, apice inter bracteas 2 oppositas patentes anguste-triangulas subcanaliculatas acutiusculas in discum verticalem semiorbicularem floriferum dilatatus; internodia superiora aequilonga, inflorescentias partiales similes ferentia, quarum terminales tantum flore centrali praeditae. Flores uniseriales, 5—8 in quaque axilla, ab axi ad bracteam florentes, flores masculi indistincti, feminei mox fructiferi. Fructus immaturus angustus basi valde attenuatus, apice tepalis 4 persistentibus et stylo brevi stigmate capitato coronatus, maturus ignotus. (Description from all the materials examined, the second number of which is in no way different from the types.)

Alola, in forest on tree, 6200 ft alt., 6 XII 1935, CARR 13660 (BD, L, types), flowers olive-yellow tipped orange-ochre; Isuarava, in forest on tree, 4800 ft alt., 5 II 1936, CARR 15403 (BD, L), parasite, flowers brownish ochre.

Observation. By the structure of its inflorescence, this species does not fit into any of the sections of *Notothixos* distinguished by VAN TIEGHEM and accepted by ENGLER. I, therefore, base a new section upon it, and take the opportunity of giving the following concise survey of sections and species, based upon the structure of the inflorescence.

Notothixos OLIVER, in Journ. Linn. Soc., bot., 7, p. 92, 103 (1864); VAN TIEGHEM, in Bull. Soc. Bot. Fr., 43 (1896) p. 186; ENGLER, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. (1897) p. 139; ed. 2, 16b (1935) p. 196.

Sect. 1. **Peneïxos** VAN TIEGHEM, in Bull. Soc. Bot. Fr., 43 (1896) p. 187; ENGLER, in ENGL. & PR., Nat. Pflanzenfam., Nachtr. (1897) p. 139 (sphalmate *Pencixos*); ed. 2, 16b (1935) p. 196.

Inflorescence composed of one single, three- or more-flowered cyme.

N. incanus (HOOKER) OLIVER, with the cymes 3-flowered, in Australia, *N. malayanus* OLIVER, with the cymes more-flowered by the development of adventicious buds, in Penang.

Sect. 2. **Eunotothixos** VAN TIEGHEM, *ibidem*; ENGLER, *ibidem*.

Inflorescence composed of many fan-like, more-flowered cymes, terminal and decussately arranged into a raceme.

N. subaureus OLIVER, with only three cymes in each inflorescence, in Australia; *N. cornifolius* OLIVER, in Australia and New Guinea, *N. leiophyllus* K. SCHUMANN, in the Philippines, the Moluccas, New Guinea, New Britain, Solomon Islands, and Queensland, and *N. Schlechteri* K. KRAUSE, in New Guinea, all of them with five or more cymes in each inflorescence.

Sect. 3. **Ixostachys** VAN TIEGHEM, *ibidem*; ENGLER, *ibidem*.

Inflorescence a spike of 3-flowered sessile, decussately arranged cymes.

N. floccosus (THWAITES) OLIVER, in Ceylon, *N. Curranii* MERRILL and *N. sulphureus* MERRILL, both in the Philippines and Borneo, and *N. spicatus* K. KRAUSE, in Java and New Guinea.

Sect. 4. **Psygmatostachys** DANSER, nov. sect.

Inflorescentia spicata, e cymis plurifloris ventilabriformibus decussatim superpositis composita.

N. papuana DANSER, in New Guinea.

The sections *Peneixos* and *Eunotothixos* show a difference only of degree. If the inflorescences of the latter were reduced to one cyme, they would be identical with those of the former section. In *Peneixos*, we have one species with the cymes in their simplest 3-flowered form, another with the cymes more-flowered and fan-like by the development of adventicious flowers. Species with the cymes 3-flowered and arranged into a raceme, are not yet known. They would form a connection with the section *Ixostachys*, where the cymes are 3-flowered and arranged into a spike. Species with such an inflorescence, but the cymes more-flowered and fan-like by adventicious buds, are not yet known. The new section *Psygmatostachys* realises another possibility. If we let the adventicious flowers out of consideration, the flowers are decussately arranged into simple spikes. Instead of the development of the lateral flowers of the triads in the axils of their lateral prophylls, we find a development of serial adventicious flowers, developing, one after the other, in the direction of the bract. If we take two opposite partial inflorescences together as one cyme, we have again realised the triads augmented with adventicious flowers. Among these augmented cymes, only the terminal one has the middle flower developed; in the lower ones this terminal flower is replaced by the axis continuing the spike. See Fig. 1, e.

XI, 1. **Viscum articulatum** BURMAN FIL. — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 460; Phil. Journ. Sc., 58, p. 141.

Veyia, parasitic on trees in forest, sea level, 11 III 1935, CARR 11650 (BD, L), fruit greenish-white.

The species, spread from India to Tropical Australia, was not collected before in New Guinea.

XI, 2. **Viscum ovalifolium** DE CANDOLLE — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, p. 466; Phil. Journ. Sc., 58, p. 139, under *V. orientale*.

Central Division, Laloki River, Rona, 450 m alt., parasitic on gully forest trees, 7 III 1933, Brass 3553 (L, double from NY), common, compact shrub, stems and branches green, yellow about the nodes, fleshy dark leaves, nerves prominent on upper side, obscure beneath, flowers golden yellow, fruit green with yellow tubercules; Kanosia, sea level, 10 II 1935, Carr 11254 (BD, L), parasitic on no. 11237, flowers green; Koitaki, forest, 1500 ft alt., 19 IV 1935, Carr 11937 (BD, L), flowers yellow-green; *ibidem*, 30 IV 1935, Carr 12098 (BD, L), parasitic, flowers yellow-green, fruit orange.

This species, so widely spread in the Malay Archipelago, and wrongly mentioned, hitherto, as *Viscum orientale* Willdenow, was collected, up to the present, in the N.W. part of New Guinea only.

Indeterminable.

Boridi, forest, 4000 ft alt., 28 IX 1935, Carr 14253 (L), tree c. 20 ft tall, fruit green.

This collection is represented, in the Leiden Herbarium, by a leafy branch without any inflorescence, and a number of small inflorescence fragments and dried, unripe fruits. The leafy twig certainly represents a *Loranthacea*, probably an *Amyema*. The inflorescence fragments and fruits resemble, at first sight, those of another *Loranthacea*, especially some *Amylotheca*, but, after more close examination, appear to belong to another family.

Index of Brass's, Carr's and Clemens numbers mentioned in this note.

Brass 746 (VII, 2); 3553 (XI, 2); 3622 (I, 2, var.); 3681 (X, 2); 3910 (X, 2); 4095 (III, 10); 4125 (III, 13); 4378 (III, 9); 4564, 4564a (III, 5); 4972 (III, 4); 5242 (III, 7); 5275 (III, 7); 5645 (VII, 2); 5782 (III, 11); 5966 (I, 3); 6023 (III, 3).

Carr 11239 (II, 1); 11242 (III, 1); 11254 (XI, 2); 11359 (VII, 1); 11577 (II, 1); 11597 (I, 3); 11650 (XI, 1); 11783 (III, 1); 11937 (XI, 2); 11940 (VI, 2); 12077 (I, 2, var.); 12098 (XI, 2); 12338 (III, 2); 12428 (VII, 2); 12574 (VI, 2); 12836 (I, 2, var.); 13013, 13060 (I, 2); 13150 (III, indet.); 13298 (III, indet.); 13660 (X, 3); 13831 (VI, 2); 13848 (III, indet.); 13851 (III, 6); 13904 (X, 1); 19317 (VI, 1); 14027 (V, 1); 14100 (III, 13); 14106 (III, indet.); 14135 (III, 10); 14143 (III, 6); 14190 (III, indet.); 14253 (indet.); 14348 (I, 2); 14640 (VI, 2); 14641 (II, 1); 14703 (X, 2); 14833 (VI, 2); 15120 (VIII, 1); 15166 (I, 2); 15192 (VI, 2); 15227 (III, 4); 15330 (I, 3); 15331 (I, 3); 15403 (X, 3); 15447 (VII, 2); 15502 (I, 1); 15558 (III, 7); 15617 (I, 3); 15778 (III, 7).

Clemens s.n. (I, 3 var.; III, 4; IV, 1; VII, 2); 289 (I, 3, var.); 563 (I, 3, var.); 782 (I, 3, var.); 819, 819a (IV, 1); 1275 (VII, indet.); 1331 (III, 1); 2370 (III, 2, VII, indet.); 2389 (VII, 2); 2931 (I, 3); 3235 (III, 12); 3381, 3381a (III, 2); 3415 (III, 2); 3455 (III, 7); 3460 (I, 2); 3847 (I, 2); 4194 (III, 8); 4544 (III, 6); 4646 (VI, 1); 4724 (I, 3, var.); 4803 (III, 2); 4996 (III, 13); 5115 (III, 2); 5156 (III, 7); 5184 (VI, 1); 5339 (IX, 1); 5385 (I, 3, var.).

EINE NEUE EUPHORBIA AUS MALESIEN

von

F. PAX und KÄTHE HOFFMANN

(Breslau).

(Herausgegeben am 2. Mai 1938).

Euphorbia Backeri PAX et K. HOFFM. n. sp. — Caules 40—150 cm alti, plerumque 60 cm superantes, basi ad 1 cm diametientes, solitarii, a basi erecti, apice saepe nutantes, basi saepe lignescentes, superne ramosi, ramis oblique erectis, simplicibus vel ramosis. Partes juveniles ± dense pilis albis, ad 2 mm longis, horizontalibus vel adscendentibus hirti, ± calvescentes. Stipulae ± $1^1/_2$ mm longae, anguste triangulares, acutae, integrae vel in segmenta acuta divisae; petiolus 2—4 mm longus; limbus 10—45 mm longus, 4—20 mm latus, lanceolatus vel oblongus, basi semicordatus, apice obtusus vel acutus, argute serratus, rarius subinteger, utraque pagina pilis crispulis, longis, rarius brevioribus, adspersus. Cyathia in inflorescentiis laxis vel densioribus, saepe ramulos axillares, microphyllinos terminantibus aggregata; pedunculi 2—8 mm longi, hirti; cyathia ± 1 mm longa, satis dense pilis crispulis vestita, glandulae rubrobrunneae, appendices iis latiores, rotundatae, demum $^3/_4$—$1^1/_4$ mm latae, albae, demum roseae, ± inaequales. Capsulae $1^1/_3$—$2^1/_4$ mm longae, crispule albipilosae; semina oblonga, distincte transverse rugosa, $1^1/_4$—$1^1/_2$ mm longa.

OST-JAVA, MADOERA, KANGEAN-ARCHIPEL, locis siccis, apricis frequens.

var. α **genuina** PAX et K. HOFFM. Pili caulis horizontaliter patentes. Folia argute serrata.

JAVA, Pasoeroean, G. Semongkrong: BACKER nr. 7727, 24222; Lekok: BACKER nr. 7762 (*Typus* der Art, Herb. Buitenz. u. Herb. Leiden); Paiton: BACKER nr. 12964; Besoeki, Asem Bagoes: BACKER nr. 8164; Watoe dodol an Strasze Bali: CLASON & VAN SLOOTEN nr. 15.

MADOERA, Sampang: BACKER nr. 19636; Soemenep: BACKER nr. 20635.

POELOE POETERAN: BACKER nr. 20815.

var. β **subintegra** PAX et K. HOFFM. Pili caulium plerumque non horizontaliter patentes. Folia integra vel dentibus obsoletis.

JAVA, Besoeki, Asem Bagoes: BACKER nr. 8246.

KANGEAN ARCHIPEL, Insel Sapapan: BACKER nr. 28433; Insel Bangko: BACKER nr. 29193.

E. pilulifera L. differt caulibus minoribus, simplicibus vel parce ramosis, glandularum appendice obsoleta vel angustissima.

E. indica Lam. differt caulibus adscendentibus vel procumbentibus, puberulis, foliis adpresse et sparsim puberulis, involucris extus intusque glabris.

E. congenera Bl. differt caulibus minoribus, basi adscendentibus, parce ramosis, seminibus obsolete rugosis; ex Koorders pilis caulium foliorumque brevibus.

E. hypericifolia L.: tota planta glabra, annua; ex Koorders: ramuli juveniles glabri vel sparsim pubescentes; herba ad $^1/_4$ m alta.

E. serrulata Reinw.: glabra, folia linearia, uninervia; ex Koorders caules $^1/_3$—$^1/_2$ m alti.

THE CONVOLVULACEAE OF MALAYSIA, I

by

S. J. VAN OOSTSTROOM

(National Herbarium, Leiden).

(Issued May 2nd, 1938).

The genera Cuscuta, Dichondra, Evolvulus, Bonamia, Neuropeltis and Porana.

This is the first contribution to a series of papers dealing with the *Convolvulaceae* of Malaysia (Malay Peninsula and Archipelago, Philippines and New Guinea). As far as possible the contributions will be published in accordance with the systematical arrangement of the genera. For a survey on this arrangement I refer to HALLIER's fundamental work on this matter published in 1893 in the 16th volume of ENGLER's Botanische Jahrbücher, entitled: "Versuch einer natürlichen Gliederung der Convolvulaceen auf morphologischer und anatomischer Grundlage". After all genera will have been published, a determination key will be added, based on the genera of the area under consideration, in which I hope to take especially account of the characters of the Malaysian species. Meanwhile the key published by HALLIER in the above mentioned paper can be provisionally used.

On account of the structure of the pollen grains the *Convolvulaceae* as a whole can be subdivided, as has been proposed by HALLIER, into two groups, viz. the *Psiloconiae* with smooth pollen grains and the *Echinoconiae* with spinose ones. The former of these groups contains seven tribes, viz. 1. *Cuscuteae,* 2. *Wilsonieae* (not in Malaysia), 3. *Dichondreae,* 4. *Dicranostyleae,* 5. *Poraneae,* 6. *Erycibeae* and 7. *Convolvuleae.* Of the six genera worked out here, *Cuscuta* belongs to the *Cuscuteae, Dichondra* to the *Dichondreae, Evolvulus, Bonamia* and *Neuropeltis* to the *Dicranostyleae* and *Porana* to the *Poraneae.* For the limitation and description of the tribes see HALLIER l.c. and in ENGLER's Botanische Jahrbücher, Vol. XVIII, 1894, p. 92, under *Prevostea.*

The materials examined by me, belong to the following herbaria:

(B) the Herbarium of the Botanic Garden, Buitenzorg.

(BD) the Herbarium of the Botanical Museum, Berlin-Dahlem.

(C) the Herbarium of the Botanic Gardens, Sibpur, Calcutta.
(K) the Herbarium of the Botanic Gardens, Kew.
(L) the National Herbarium (Rijksherbarium), Leiden.
(M) the Herbarium, Bureau of Science, Manila.
(P) the Herbarium of the Natural History Museum, Paris.
(Pa) the Herbarium of the Experiment Station for the Java Sugar Industry, Pasoeroean, Java.
(S) the Herbarium of the Botanic Gardens, Singapore.
(U) the Herbarium of the University, Utrecht.

I feel greatly indebted to the Directors and Keepers of these herbaria, for their kind assistance.

I. CUSCUTA L.

L., Spec. Pl. ed. 1 (1753) p. 124; Choisy in Mém. Soc. Phys. Genève IX (1841) p. 268; id. in DC., Prodr. IX (1845) p. 452; Miq., Fl. Nederl. Ind. II (1857) p. 631; Engelmann in Trans. Acad. Sci. St. Louis I (1859) p. 453; Benth., Fl. Austr. IV (1869) p. 440; Benth. et Hook., Gen. Plant. II (1876) p. 881; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 225; Baillon, Hist. Pl. X (1891) p. 330; Peter in Engl.-Prantl, Nat. Pfl. fam. IV, 3a (1891) p. 38; Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 568; Trimen, Handb. Fl. Ceylon III (1895) p. 228; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 493, 507; Baker and Rendle in Thiselt.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 202; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 286; Koorders, Exk. fl. Java III (1912) p. 109; Gagnep. et Courchet in Lecomte, Fl. Indo-Chine IV, 3 (1915) p. 310; Ridley, Fl. Malay Penins. II (1923) p. 443; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 510; Yuncker in Mem. Torr. Bot. Club XVIII (1932) p. 113.

Herbaceous parasites with slender, often filiform, twining stems, with haustoria. Leaves reduced to small scales. Flowers small, mostly in cymose clusters, 5-merous, rarely 4- or 3-merous. Calyx usually 5-lobed, 5-parted or consisting of 5 free sepals. Corolla tubular, urceolate, globose or campanulate, usually 5-lobed, the tube with 5 crenulate or fimbriate episepalous scales inside. Stamens 5, inserted on the corolla above the scales; pollen smooth. Ovary 2-celled, each cell with 2 ovules. Styles distinct or connate; stigmas capitate or elongated. Fruit an ovoid or globose capsule, opening irregularly or circumscissile, or remaining closed. Seeds 4 or less, generally glabrous; embryo acotyledonous, filiform, enlarged at one end.

Distribution (according to Yuncker): Cosmopolitan, the largest number of species in America, from Southern Canada to Northern Chile and Argentina. In the Old World from about the 60th parallel North in Europe and Asia to the Cape region in South Africa; also but less abundant in Malaysia, the Pacific Islands and in Australia. According to MERRILL the genus is not represented in the Philippine Islands: "Although I spent 22 years in the Philippines, for the most part devoted to botanical work, I have never seen a specimen of *Cuscuta* from the islands, and I am confident that the genus is not represented there" (see YUNCKER l.c. p. 109). It is also unknown from Borneo, Celebes and the Moluccas.

In accordance with ENGELMANN (l.c. p. 459—460), who divided the genus into three groups, the *Cuscuta* group, the *Grammica* group and the *Monogyna* group, YUNCKER l.c. p. 119 etc. distinguished three subgenera, under the same names. Only the two last-named of these subgenera occur in the area considered.

Key to the species.

1a. Styles 2, distinct (Subgenus *Grammica*) . . . . 2.
b. Style 1 (Subgenus *Monogyna*) . . . . 3.
2a. Corolla lobes obtuse; calyx lobes not overlapping; scales short, deeply bifid with few fimbriae . . . . **1. C. australis**
b. Corolla lobes acute; calyx lobes slightly overlapping at the base; scales ovate, not bifid, abundantly fimbriate . . . . **2. C. campestris**
3a. Style longer than the stigmas; corolla tube as long as the lobes, scales represented by narrow wings . . . . **3. C. timorensis**
b. Style shorter than the elongate stigmas; corolla tube 2.5—3 times as long as the lobes; scales ovate to oblong, abundantly fimbriate . . **4. C. reflexa**

Subgenus **Grammica** (LOUR.) YUNCK.

YUNCKER in Mem. Torr. Bot. Club XVIII (1932) p. 122 — *Grammica* LOUR., Fl. Cochinch. I (1790) p. 170 — *Cuscuta*, group *Grammica* (LOUR.) ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 459, 460.

Flowers mostly pedicellate. Styles 2, stigmas mostly globose, capitate; capsule opening or not.

YUNCKER divided this subgenus into two sections, 1. *Clistogrammica* ENGELM. em. YUNCK. [1]) (*Clistogrammica* ENGELM. + *Lobostigma* ENGELM.) with capsules remaining closed at maturity and 2. *Eugrammica* ENGELM. with capsules opening by circumscission. Only the first section is represented in the area considered in this paper.

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[1]) Although ENGELMANN published the name *Clistogrammica*, YUNCKER changed it into *Cleistogrammica*, probably because he thought that *Clistogrammica* was a misprint for *Cleistogrammica*. Of course *Clistogrammica* is the valid name.

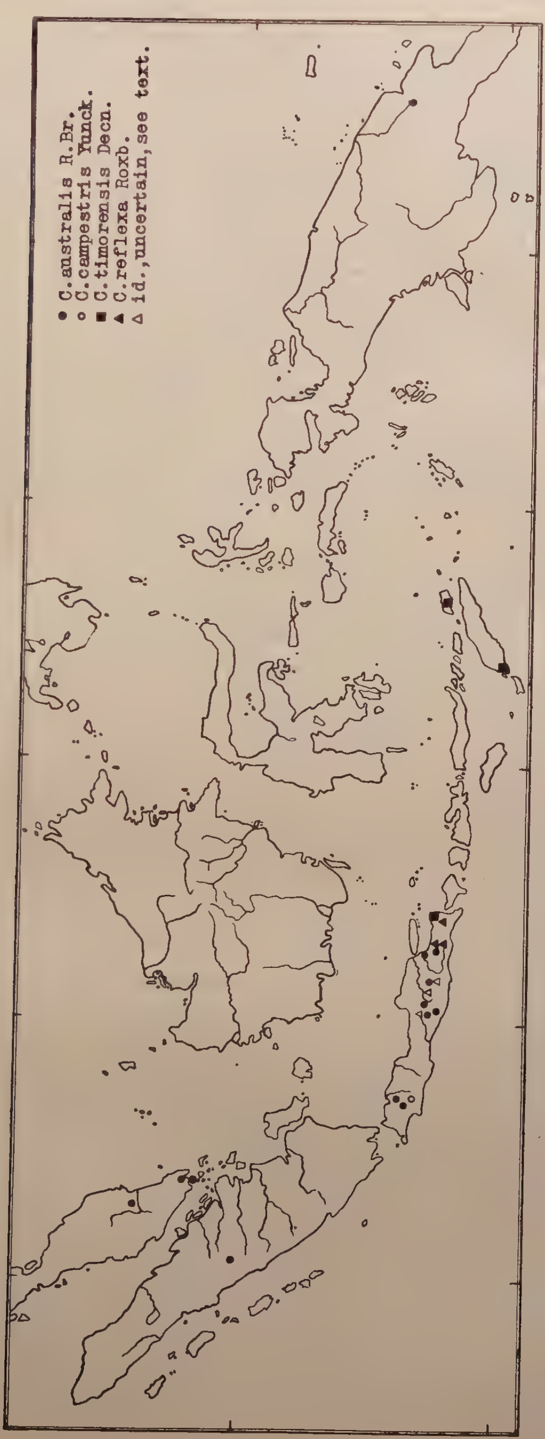

Fig. 1. Distribution of the species of *Cuscuta* in Malaysia.

1. **Cuscuta australis** R.BR., Prodr. Fl. Nov. Holl. I (1810) p. 491; CHOISY in Mém. Soc. Phys. Genève IX (1841) p. 280; id. in DC., Prodr. IX (1845) p. 458; BENTH., Fl. Austr. IV (1869) p. 441; BAILEY, Queensl. Fl. IV (1901) p. 1075; id., Compr. Cat. Queensl. Pl. 2 ed. (1909) p. 353, fig. 330; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1298; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 511; YUNCKER in Mem. Torr. Bot. Club XVIII (1932) p. 124; VAN STEENIS in Trop. Nat. XXIII (1934), p. 50 — *C. obtusiflora* H. B.K. var. *australis* (R. BR.) ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 492 — *C. Hygrophilae* PEARSON in HOOK., Ic. Pl. IV, 8 (1901) pl. 2704; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 286; GAGNEP. et COURCHET in LECOMTE, Fl. Indo-Chine IV, 3 (1915) p. 311; RIDLEY, Fl. Mal. Penins. II (1923) p. 444 — *C. nuda* PILGER in ENGL., Bot. Jahrb. LIX (1924) p. 84. Mentioned by KOORDERS in his Exkursionsflora III (1912) p. 109 under the name *C. chinensis* LAMK.

Stems thin, filiform, greenish yellow, yellow or orange (BACKER). Flowers small, 2—2.5 mm long, in small compact clusters, shortly pedicellate. Calyx about as long as the corolla tube, 1.5—2 mm, the lobes ovate to orbicular, more or less unequal in length and in breadth, obtuse, not imbricate and not keeled. Corolla white, greenish white or cream white, the lobes usually a little shorter than the tube or equal to this, broad-ovate, or narrower, obtuse or subobtuse, erect or spreading. Stamens somewhat shorter than the corolla lobes, the filaments well-developed, as long as or longer than the ovate sulphur yellow (BAKHUIZEN VAN DEN BRINK) anthers. Scales short, deeply bifid with few long fimbriae. Styles 2, a little unequal, shorter than the ovary; stigmas yellow (BACKER), depressed-globose. Ovary depressed-globose. Capsule depressed-globose or obpyriform, 3—4 mm in diam., with large inter-stylar opening, not opening by circumscission, 4—3-seeded. Seeds oval, 1.5 mm long, brownish.

MALAY PENINSULA, Pahang, Raylet, Cameron's Highlands, about 3500 ft, A. B. MILNE, Oct. 1933 (S); Johor, Johore Town, near the saw-mills, RIDLEY 9161, Apr. 1898 (C, K, *type of C. Hygrophilae* PEARS.; S); Singapore, Victoria Street, RIDLEY 12124, Dec. 1904 (B, K, S); Payah Lebar, RIDLEY 13316 (S).

SUMATRA, West Coast, Pajokoemboeh, 500 m, E. JACOBSON 151 (B).

JAVA, Buitenzorg, Buitenzorg, about 250 m, BACKER s.n. (L, U); id., BACKER 32297, July 1910 (B); id., BACKER 32298, Jan. 1920 (B, L); id., KARTAMAH, Oct. 1919 (B); id., BAKHUIZEN VAN DEN BRINK 3665, Apr. 1920 (B, L, M, U); id., DOCTERS VAN LEEUWEN s.n., June 1929 (B); cultivated in the Bot. Gard., HALLIER C 160a, Aug. 1894 (L); Tjibinong, VAN HEETEREN s.n., May 1935 (B, S); Kedoe, Moentilan, about 350 m, VAN RIJCKEVORSSEL s.n. (B); Djogjakarta, Djogjakarta, VAN STEENIS 2657, Jan. 1929 (B); Soerakarta, Soerakarta, VAN RIJCKE-

VORSSEL s.n., Dec. 1929 (B); Madioen, Madioen, DOCTERS VAN LEEUWEN 8623, Dec. 1925 (B, L, U); Soerabaja, Soerabaja, A. OTKEN—VAN LAKERVELD s.n., May 1930 (B); id., A. RANT 2, May 1929 (B, K, L); Malang, Kepandjèn near Malang, G. J. OVERDIJKINK s.n. (B).

NEW GUINEA, Territory of New Guinea, Bismarck Mts, in forest, 1100 m, R. SCHLECHTER 18612, Nov. 1908 (BD, *type of C. nuda* PILGER; K, P).

Distribution: (according to YUNCKER l.c.) Turkestan and India to Manchuria, Korea, eastern China and Japan, southward to Java, New Guinea and Australia.

Vernacular names: djamoedjoe, mamoedjoe, moedjoe-moedjoe (jav., HEYNE l.c.); tjatjingan (jav., BACKER l.c.); majamoejoe (mad., HEYNE l.c.); ramat ĕmas (sund., from ramat = cobweb and ĕmas = gold, according to VAN HEETEREN).

Use: According to HEYNE the seeds are used in the native medicine-trade. Seeds are imported into the Archipelago from China. Softening properties are attributed to them.

Hosts: according to YUNCKER often on *Polygonum* but also on many other herbaceous plants as *Soja, Dianthera, Artemisia, Piper, Genista, Lespedeza, Glycine, Xanthium, Pelargonium,* etc. According to herbarium labels, in the area considered also on *Codiaeum, Croton, Baccaurea, Piper aduncum* L., *Nothopanax Scutellarium* (BURM.) MERR., *Polyscias, Hygrophila quadrivalvis* NEES (the type of *C. Hygrophilae* PEARSON), *Dianthera leptostachya* BENTH., *Tecoma stans* JUSS., *Ocimum Basilicum* L., *Pluchea indica* LESS.

According to an annotation on a field label by MILNE this species is regarded as a pest and is said to be liable to become dangerous (Malay Peninsula).

Remarks. 1. The dimensions of the flowers appear to be rather variable and so are the dimensions and the form of the corolla-scales. The latter are always deeply bifid with fimbriate lobes. In general they are rather obvious. Sometimes, however, they are very small and are easily overlooked. This must have been the case in the specimen on which PILGER based his *C. nuda*. Especially the Berlin specimen of this collection (SCHLECHTER n. 18612) has very small scales, as they are only represented by a very narrow wing with a few fimbriae. In the duplicate specimen in the Kew herbarium the scales are much more developed. The specimens doubtless belong to the present species.

2. Between *C. Hygrophilae,* described by PEARSON from the Malay Peninsula and the specimens of *C. australis* from the Malay Archipelago I do not see any important difference. The flowers sometimes may be slightly smaller than is commonly found in Malaysian or Australian spe-

cimens, but the dimension of the corolla is rather variable, even in the same plant. I agree with YUNCKER, that *C. Hygrophilae* is to be considered as a synonym of *C. australis.*

3. Concerning the form and dimensions of the calyx-lobes, may be said, that in many cases their length and width is rather equal in the 5 lobes of one calyx, in others, however, they can considerably vary.

4. The corolla lobes are, as a rule, obtuse; somewhat acute lobes, however, occur also.

2. Cuscuta campestris YUNCK. in Mem. Torr. Bot. Club XVIII (1932) p. 138 — *C. arvensis* HOOK., Fl. Bor. Am. II (1840) p. 77, as a synonym without description; ENGELM. in A. GRAY, Man. Bot. 2nd ed. (1856) p. 336, in part, not BEYRICH — *C. pentagona* ENGELM. var. *calycina* ENGELM. in Am. Journ. Sci. and Arts XLV (1845) p. 76 — *C. arvensis* ENGELM. var. *calycina* ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 495.

Stems thin, filiform. Flowers small, 2—2.5 mm long, in small, compact, globular clusters, short-pedicellate, pedicels shorter than the flowers. Calyx about as long as the corolla tube, ± 1.5 mm, the lobes orbicular, rounded, slightly overlapping at the base. Corolla lobes about as long as the tube, broad-triangular, acute, spreading, the tips erect or inflexed. Stamens somewhat shorter than the corolla lobes, the filaments well-developed, as long as or slightly longer than the ovate anthers. Scales ovate, exserted, not bifid, fimbriate. Styles 2, about equal, about as long as the ovary; stigmas depressed-globose; ovary depressed-globose; capsule depressed-globose, 3 mm in diam., with interstylar opening, not circumscissile. Seeds 2, ovate, flattened on one side.

JAVA, Priangan, Tjiandjoer, Tjikènèrè, HEUBEL s.n., Oct. 1934 (B) (first and only record from the Malay Archipelago).

Distribution: A native of the United States of America, now distributed also through the West Indies, South America, Europe, South Africa, China, Japan, Australia and Polynesia.

Hosts: Often on *Trifolium* and *Medicago sativa,* but also on a great number of other herbaceous hosts; according to YUNCKER on *Ipomoea, Xanthium, Aster, Pelargonium, Beta, Callistephus, Artemisia, Ambrosia, Dianthera, Bidens, Sonchus, Cirsium, Capsicum, Ammi,* etc. The specimens (1 number) from Java on *Cinchona, Cosmos* and *Gynura crepidioides* BENTH.

Subgenus **Monogyna** (ENGELM.) YUNCK.

YUNCKER in Mem. Torr. Bot. Club XVIII (1932) p. 248 — *Cuscuta,* group *Monogyna* ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 460.

Flowers sessile or short-pedicellate. Style 1, stigmas globose, ovate, conic or flattened. Capsule circumscissile.

Two sections can be distinguished here, viz. 1. *Monogynella* ENGELM. with the style as long as or longer than the stigmas and 2. *Callianche* ENGELM. with the style shorter than the stigmas. To the first section belongs as only Malaysian species *C. timorensis,* to the second, monotypic section *C. reflexa.*

3. **Cuscuta timorensis** DECN. ex ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 514; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 511; YUNCKER in Mem. Torr. Bot. Club XVIII (1932) p. 250; VAN STEENIS in Trop. Nat. XXIII (1934) p. 50.

Mentioned by several authors (CHOISY in Mém. Soc. Phys. Genève IX (1841) p. 274; id. in DC., Prodr. IX (1845) p. 455; MIQ., Fl. Ned. Ind. II (1857) p. 632; FORBES, Wander., Germ. ed. II (1886) p. 222; BOERLAGE, Handl. Fl. Ned. Ind. II (1899) p. 507) under the name *C. monogyna* VAHL, which is, however, a different species, occurring in Europe, Central Asia and N. Africa.

Stems coarse, brownish- or yellowish red (BACKER), 1—1.5 mm thick (2 mm or more, BACKER). Flowers in short racemes on very short pedicels in the axils of broad triangular obtuse bracts; the common peduncle rather thick, 1—2.5 cm long, occasionally branched near the base. Calyx cupulate, the lobes orbicular, broadly rounded at the apex, overlapping, thick, the edges more or less unequal; calyx persistent. Corolla yellowish white (BACKER), campanulate, 3—3.5 mm long with lobes as long as the tube, ovate, obtuse, crenulate, erect or reflexed, soon breaking loose and remaining on the developing capsule. Stamens subsessile, or with a very short thick filament, much shorter than the oval anther, inserted at the sinus; anthers much shorter than the corolla lobes. Scales represented only by narrow wings. Ovary ovate-conic, style shorter than the ovary, not divided, stigmas small, depressed-globose. Capsule ovate-oblong, mucronate by the style, circumscissile near the base, 5 mm high, without opening at the top, 1—2 seeded (BACKER).

JAVA, Bondowoso, Asĕm Bagoes, c. 10 m alt., BACKER 8276, May 1913 (B, L), the only specimen from Java, growing in a very dry locality.

TIMOR, Koepang, TEYSMANN s.n. (B, K, L); without exact locality, without collector's name (L, probably a duplicate of the type in herb. Paris).

WETAR, RIEDEL s.n. (K).

Distribution: Besides the localities mentioned above also in Central Africa (Nyassa, Usambara, Tanganyika). I did not see the African specimens, but YUNCKER states that he is "unable to distinguish between the Malayan forms of the species and those examined from Africa".

Hosts: *Ficus glomerata* ROXB. (BACKER 8276); the specimens collected by TEYSMANN also on woody plants.

Remarks. YUNCKER l.c. states: "It may be that *C. timorensis* represents a more northern and eastern form of *C. cassytoides* (from South Africa, S. J. v. O.). However, the scales in *C. timorensis* seem to differ in being more reduced: the filaments are slightly longer and the styles are shorter and with smaller stigmas, but there is considerable variation in these characters within the species. Further collections are necessary to clear up this question of relationship".

4. **Cuscuta reflexa** ROXB., Pl. Coast Corom. II (1798) p. 3, t. 104; id., Fl. Ind. I (1832) p. 446; CHOISY in Mém. Soc. Phys. Genève IX (1841) p. 273; id. in DC., Prodr. IX (1845) p. 454; MIQ., Fl. Nederl. Ind. II (1857) p. 631; ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 518; CURTIS, Bot. Mag. XXXVII (1881) t. 6566; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 225; FORBES, Wander., Germ. ed. II (1886) p. 222; PRAIN in Journ. As. Soc. Beng. LXIII (1894) p. 115; TRIMEN, Fl. Ceylon III (1895) p. 229; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 507; KOORDERS in Natuurk. Tijdschr. Ned. Ind. LX (1901) p. 256; COOKE, Fl. Bombay II (1905) p. 224; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 100; KOORDERS, Exk. fl. Java III (1912) p. 109, fig. 8; HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 375; KOORD.-SCHUM., Syst. Verz. I (1910—'13) Convolv. p. 1; BASU, Indian Med. Pl. pt. III (1918) pl. 668 A; GAMBLE, Fl. Pres. Madras V (1923) p. 931; YUNCKER in Mem. Torr. Bot. Club XVIII (1932) p. 259; RENNER in Ann. Jard. Buitenz. XLIV (1934) p. 90, t. XIII, fig. 32; VAN STEENIS in Bull. Jard. bot. Buitenz. Sér. III, XIII (1934) p. 194; id. in Trop. Nat. XXIII (1934) p. 50 — *C. verrucosa* SWEET, Brit. Fl. Gard. I, 2 (1823) pl. 6, not ENGELM. — *C. Hookeri* SWEET, Hort. Brit. II (1826) p. 290 — *C. macrantha* DON, Gen. Syst. IV (1838) p. 305; ZOLL., Syst. Verz. (1854) p. 130, 134; MIQ., Fl. Ned. Ind. II (1857) p. 631 — *C. grandiflora* WALL., Cat. no. 1318, not of HBK. — *C. elatior* CHOISY in Mém. Soc. Phys. Genève IX (1841) p. 273 — *C. reflexa* ROXB. var. *grandiflora* ENGELM. in Trans. Acad. Sci. St. Louis I (1859) p. 518.

Stems coarse, to 2.5 mm or more in diam., often on high trees, pale green or yellowish green. Flowers sessile or on a very short pedicel, in small groups or in racemes or in racemes consisting of small groups of flowers. Calyx greenish, cup-shaped, 3—4 mm, the lobes orbicular, obtuse, overlapping, less than half as long as the corolla tube, the margin finely crenate or entire, the back verrucose-carinate. Corolla yellowish white, creamy of white, campanulate-tubular, 6—10 mm long, the tube 2.5—3 times as long as the lobes, lobes narrow-ovate to ovate-triangular, obtuse or subacute, irregularly crenate at the margin or entire, upright, spreading or reflexed. Scales well-developed, ovate to oblong, scarcely reaching the middle of the corolla tube, abundantly fimbriate. Anthers ovate-oblong, on very short thick filaments, inserted just below the sinus. Ovary ovate-conic, style short, thick; stigmas 2, elongated, narrowly ligulate to subulate, much longer than the style, at first erect, afterwards divergent. Capsule globose-conic, 5—10 mm high, circumscissile near the base, in a young stage often carrying the withered corolla at the top. Seeds black, 4 or less, 3—3.5 mm long; hilum a narrow transverse, terminal line.

JAVA, without exact locality, VAN DER PIJL 140c (B); Kedoe, G. Menjir, dessah Aglik, 1000 m, DOCTERS VAN LEEUWEN 137, Sept. 1911 (uncertain, a specimen without flowers in B); Madioen, Sarangan, E. Lawoe, c. 1433 m, RANT s.n. (uncertain, a specimen without flowers in B); Panaraga, Ngebel, c. 833 m, RANT s.n. (uncertain, specimens without flowers in B and L); Pasoeroean, near Ngadisari, 2400 m, KOORDERS 37381 β, Oct. 1899 (B, K, L); id., 1900 m, BACKER 36289, Jan. 1925 (Pa); Tosari, very common, RANT s.n., Apr. 1927 (B); id., ROTHERT s.n., May 1909 (B); id., about 1700 m, BACKER 8344, June 1913 (B, L); above Tosari, JESWIET s.n., 1929 (Pa); above Djarakidjo, S. W. Tengger, c. 2000 m, frequent, BEUMÉE A 630, June 1928 (B); Tengger, KOBUS (B); id., KUYPER B. 406 (B); id., WARBURG 4197, 1886—87 (BD, M); Lebaksari, near Poedjon, RANT s.n., Oct. 1930 (B); Klètak above Nongkodjadjar, 1800 m, WISSE 566, June 1921 (B); Malang-Probolinggo, G. Semeroe, Ajak-ajak, c. 2700 m, DOCTERS VAN LEEUWEN 8497, Sept. 1925 (B); Bondowoso-Djember, Kawah-Idjen, c. 2000 m, common, KOORDERS 43185 β, July 1916 (B, L); Idjen, near Pondok, 2300 m, CLASON—LAARMAN E 71, June 1931 (B); G. Widodaren, c. 1900—2150 m, BACKER 25298, June 1918 (B, L); G. Ranté, near Poeger, c. 2100 m, ZOLLINGER 2839, Apr. 1845 (B, P; in U a specimen ZOLLINGER s.n.).

Distribution: (according to YUNCKER) "From Afghanistan and Baluchistan throughout northern India to Yunnan, China and in Java and Ceylon."

Vernacular name: oelan-oelan (jav., according to KOORDERS, 1901, from oelo (jav.) = serpent).

Use: See WATT, Dict. Econ. Prod. India II (1889) p. 671; as far as I know of no economical value in the Malay Archipelago.

Hosts: On *Lavatera, Duranta, Aquilegia, Fragaria, Nerium, Adhatoda, Viburnum, Parkinsonia, Coffea, Calotropis, Zizyphus, Apluda, Achyranthes, Peristrophe, Capparis, Melia, Carissa, Clerodendron, Cocculus, Thevetia, Citrus,* etc. (YUNCKER). According to herbarium labels moreover on: *Casuarina, Boehmeria clidemioides* MIQ., *Maoutia diversifolia* (BL.) WEDD., *Engelhardtia spicata* BL., *Polygonum chinense* L., *Rubus Horsfieldii* MIQ., *Fuchsia coccinea* AIT., *Cestrum, Justicia gendarussa* L., *Stachytarpheta, Artemisia vulgaris* L. KOORDERS 37381β: in dense clusters, covering a whole tree-crown (of *Engelhardtia,* near Ngadisari). BACKER 25298: covering the host like a net. See the photograph in Ann. Jard. Bot. Buitenz. XLIV (1934) p. 90, t. XIII, representing the species on a large tree of *Engelhardtia spicata* BL.

Remarks. In the Malay Archipelago the species seems to be restricted to the eastern part of Java, where it occurs with certainty between 1900 and 2700 m altitude. The identification of the specimens from lower localities in Kedoe and Madioen is not quite certain, as they have been collected in a sterile state. According to VAN STEENIS ”on the E. Javan mountains between 1500 and 2700 m alt., possibly descending to 1100 m and perhaps (in sterile specimens) also found in M. Java (west as far as G. Soembing)“. All data concerning the occurrence of the species in the island of Timor (CHOISY, MIQUEL) refer to *C. timorensis.*

II. DICHONDRA FORST.

FORST., Char. Gen. (1776) p. 39, t. 20; id., German ed., transl. by KERNER (1779) p. 39, t. IV, fig. 20; CHOISY in Mém. Soc. Phys. Genève V (1832) p. 497; id. in DC., Prodr. IX (1845) p. 451; MIQ., Fl. Ned. Ind. II (1857) p. 630; BENTH., Fl. Austr. IV (1869) p. 438; BENTH. et HOOK., Gen. Plant. II (1876) p. 879; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 180; BAILL., Hist. Pl. X (1891) p. 330; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 13; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 569; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 494, 507; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 65; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 310; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 357 — *Demidofia* J. F. GMEL. in L., Syst. Nat., ed. GMELIN II (1791) p. 458 — *Steripha* BANKS ex GAERTN., Fruct. et Sem. plant. II (1791) p. 81, t. 94.

Small, prostrate, creeping herbs, glabrous or covered with soft hairs. Leaves generally small, petioled, entire, kidney-shaped or orbicular-cordate. Flowers small, solitary in the leaf-axils. Sepals 5, free, subequal, often spathulate. Corolla widely campanulate, deeply 5-lobed, lobes induplicate-valvate or slightly imbricate. Stamens shorter than corolla, filaments filiform, anthers small, introrse, pollen smooth. Disk small, hypogynous. Ovary deeply 2-lobed, each lobe with 2 ovules; styles 2, filiform, gynobasic (inserted between the lobes), stigmas capitate. Capsule 2-lobed, lobes erect, membranous, 1 or rarely 2-seeded, indehiscent or irregularly 2-valved. Seeds subglobose, smooth, with thin testa; cotyledons linear-oblong, plicate.

Distribution: A small genus with 4—5 species, principally American, one species in the tropical and sub-tropical regions of both hemispheres. In the area considered in this paper only one species has been recorded, viz. *Dichondra repens* Forst., collected in the Philippine Islands.

Dichondra repens Forst., Char. Gen. (1776) p. 40, t. 20; id. German ed., transl. by Kerner (1779) p. 39, t. IV, fig. 20; R. Br., Prodr., ed. 1 (1810) p. 491; Wall., Cat. (1828) n. 1339; Choisy in Mém. Soc. Phys. Genève V (1832) p. 497; Hassk., Cat. Plant. Hort. Bogor. cult. alt. (1844) p. 138; Choisy in DC., Prodr. IX (1845) p. 451; Miq., Fl. Ned. Ind. II (1857) p. 630; Benth., Fl. Austr. IV (1869) p. 438; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 180; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 114; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 82; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 507; Manson Bailey, Queensl. Fl. IV (1901) p. 1074; Baker and Wright in This.-Dyer, Fl. Cap. IV, 2 (1904) p. 83; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 65; Manson Bailey, Compr. Cat. Queensl. Pl. (1909) p. 353; Merrill in Philipp. Journ. Sci., Bot., V (1910) p. 225; Gagnep. et Courch. in Lec., Fl. Indo-Chine IV (1915) p. 310, fig. 36, 9 (p. 307); Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 357 — *Sibthorpia evolvulacea* L. f., Suppl. (1781) p. 288 — *Demidofia repens* J. F. Gmel., Syst. (1791) p. 458 — *Steripha reniformis* Solander ex Gaertn., Fruct. et Sem. plant. II (1791) p. 81, t. 94 — *Dichondra evolvulacea* (L. f.) Britton in Mem. Torr. Bot. Club V (1894) p. 268.

A small creeping perennial herb, with slender short-pilose stems, rooting at the nodes. Leaves long-petioled, kidney-shaped to orbicular, broadly cordate at the base, broadly rounded or emarginate at the apex, with appressed hairs, especially below, variable in size, 4—25 mm in diam. Flowers axillary, solitary, pedicel mostly shorter than the petiole, filiform; sepals obovate-oblong to spathulate, obtuse, about 2—3 mm long, hairy on the back and along the margins; corolla shorter to slightly longer than the calyx, yellowish, deeply 5-lobed. Carpels about as long as the calyx, pilose; seeds yellow to brown, glabrous.

PHILIPPINE ISLANDS, Luzon, Bontoc subprovince, Bauco, Father VANOVERBERGH 19, Jan. 1910, first and, so far as I know, only record from the Philippines (BD, L, M). According to MERRILL (1910, 1923) on dry slopes, altitude about 1300 m; very rare or local in the Philippines.

Distribution: America, from the southern United States to Patagonia; tropical Africa (Nile Land, Guinea, East Africa, Socotra, Mascarene Islands, St. Helena), South Africa; Upper Burma, China, Japan, Formosa, Philippines; Australia, Tasmania, New Zealand.

Vernacular names: lutlutud (Bontok language); napalapayag (Iloko language) (Philippines, MERRILL, l.c., 1923).

Remarks. The specimens collected by VANOVERBERGH (n. 19) are very small, their leaves are only 2—5 mm in diameter. The species shows some resemblance in habit with *Merremia emarginata* (BURM. f.) HALL. f., with which it has been confounded in the herbaria.

III. EVOLVULUS L.

See VAN OOSTSTROOM, A monograph of the genus Evolvulus in Meded. Bot. Mus. en Herb. Utrecht, 14 (1934) p. 1—267.

The genus *Evolvulus* is represented in Malaysia by one species:

Evolvulus alsinoides L., of which the typical form (l.c., p. 26) and four varieties have been found, viz. var. *hirsutus* (LAMK.) VAN OOSTSTR. (l.c., p. 29), var. *philippinensis* VAN OOSTSTR. (l.c., p. 30), var. *decumbens* (R. BR.) VAN OOSTSTR. (l.c., p. 38) and var. *javanicus* (BL.) VAN OOSTSTR. (l.c., p. 39). The collector's numbers I could examine may be found l.c., p. 54, 55. To these numbers can be added the following ones, together with some additional remarks:

MALAY PENINSULA, Pahang, Penor, sealevel, in old dunes, CORNER 29916, Aug. 1935 (B, var. *decumbens*). Specimens formerly mentioned as being typical *E. alsinoides* but resembling var. *debilis* (l.c., p. 41 and 54) must be reckoned to var. *decumbens*.

SUMATRA, Atjeh and Dependencies, near Takengon, 1300 m, grassy slope in *Pinus* forest, 1 specimen, VAN STEENIS 5993, Aug. 1934 (B, var. *decumbens*); East Coast, Bila Uplands, 80 m, rare, LÖRZING 9618, Apr. 1923 (B, var. *decumbens*); Tapanoeli, between Baligé and Goergoer, on moist open sand, not common, OUWEHAND 114 (B, var. *decumbens*); Riouw and Dependencies, Anambas Islands: the specimen HENDERSON 20511 represents a form of var. *hirsutus* with rather narrow leaves; HENDERSON 20340 might be considered as an intermediate between var. *hirsutus* and var. *decumbens*.

JAVA. The specimen ZOLLINGER 2794 (l.c., p. 55) is not typical but belongs to var. *decumbens*. Specimens cultivated in the Botanic Garden at Buitenzorg under number XV KB XII 9, introduced from Ambon, belong to var. *decumbens* (B).

CELEBES, Celebes and Dependencies, Timampoe, 300 m, alang fields, rare, KJELLBERG 4010, Sept. 1929 (B, var. *decumbens*); Pasoei, 600 m, dry alang fields, very rare, KJELLBERG 4005, May 1929 (B, var. *decumbens*); Mori, Mekan, Ensa and Kolaka, dry grassy places, KAUDERN 352, June 1919 (L, Stockholm, var. *decumbens*).

AMBOINA, Amboina, in forest, May 1842, FORSTEN (L, var. *decumbens*); Waai, beach, RANT 755, Nov. 1931 (B, var. *decumbens*).

BALI, Gilimanoek, dry lawns behind beach, 1 m, VAN STEENIS 7589, April 1936 (B, var. *decumbens*).

WETAR, slopes above Iliwaki, in *Eucalyptus* bushes, 150—450 m, on rather dry volcanic soil, ELBERT 4382, Febr. 1910 (L, var. *decumbens*); Ilmedo, in *Eucalyptus* savannah, 0—50 m, on rather dry soil, ELBERT 4666, March 1910 (L. var. *javanicus*).

NEW GUINEA, Papua, Kanosia, savannah, c. 50 ft., CARR 11191, Febr. 1935 (L, var. *decumbens*); id., id., c. 100 ft., CARR 11752, Apr. 1935, L, var. *decumbens*).

IV. BONAMIA DUPETIT-THOUARS

DUPETIT-THOUARS, Hist. veg. Isl. Austr. Afr. I (1806) p. 17, 32, t. 5; POIR. in LAM., Encycl. Méth., Botanique, Suppl. I (1810) p. 677; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 495; id. in DC., Prodr. IX (1845) p. 439; BENTH. et HOOK., Gen. Plant. II (1876) p. 877; BAILL., Hist. Pl. X (1891) p. 327; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 17, 376; HALL. f. in ENGL., Bot. Jahrb. XVI (1893), p. 527, 573; HALL. f. in Bull. Herb. Boiss. V (1897) p. 804, 996; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 496, 507; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 78; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 298; KOORDERS, Exk. Fl. Java III (1912) p. 110; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 289; RIDL., Fl. Malay Penins. II (1923) p. 454; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 357 — *Breweria* R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 487; BLUME, Bijdr. (1825) p. 722; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 492, t. II, f. 14; id. in DC., Prodr. IX (1845) p. 438; MIQ., Fl. Ned. Ind. II (1857) p. 627; BENTH., Fl. Austr. IV (1869) p. 435; BENTH. et HOOK., Gen. Plant. II (1876) p. 876; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 223; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 16; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 227 — *Trichantha* KARST. et TRIANA in Linnaea XXVIII (1856) p. 437, non HOOK.

Herbaceous or woody twiners or erect undershrubs. Leaves herbaceous or rarely subcoriaceous, entire, lanceolate, ovate or elliptic. Flowers regular, axillary, solitary or in cymes which sometimes form terminal panicles; bracts generally small. Sepals 5, equal or subequal, rarely very unequal, orbicular to lanceolate, coriaceous or herbaceous, not membranaceous. Corolla funnel-shaped, small or medium-sized, blue or white, 5-lobed, with hairy midpetaline bands outside. Stamens and styles included, very rarely slightly exserted. Filaments glandular or glabrous, anthers oblong, cordate or sagittate at the base. Pollen smooth. Ovary 2-celled, each cell with 2 ovules. Style bifid or 2 free styles, often unequal in length, rarely 1 style. Stigmas 2, globose or peltate, rarely 2-partite or stigmas 4. Disk small or none. Capsule 2-, 4- or 8-valved, 2-celled, 4- or less-seeded. Seeds glabrous or pilose.

Distribution: About 40 species, widely distributed in the tropics.

Bonamia semidigyna (ROXB.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 528; id. in l.c. XVIII (1894) p. 90, excl. syn. *Breweria abscissa* CHOISY, cf. HALL. f. in Bull. Herb. Boiss. V (1897) p. 382, 812; id. in Versl. 's Lands Plantent. 1895 (1896) p. 125 (*Bonamina s.*); id. in Bull. Herb. Boiss. V (1897) p. 382, 814, t. 15; KOORDERS in Meded. 's Lands Plantent. XIX (1898) p. 542 (this is var. *farinacea*); BOERL., Handl. Fl. Ned. Ind. II (1899) p. 507; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 299; KOORDERS, Exk. fl. Java III (1912) p. 110; KOORDERS-SCHUM., Syst. Verz. I (1910—13) Conv., p. 8; id., III (1914) p. 109; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 289; BOLD., Zakfl. Java (1916) n. 800; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 507; RIDL., Fl. Malay Penins. II (1923) p. 454; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 357 — *Convolvulus semidigynus* ROXB., Hort. Beng. (1814) p. 13, nomen; ROXB., Fl. Ind. II (1824) p. 47; WALL., Cat. (1828) n. 1405; ROXB., Fl. Ind. I (1832) p. 468 — *Breweria cordata* BL., Bijdr. (1825) p. 722; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 493; id. in DC., Prodr. IX (1845) p. 438; MORITZI, Verz. (1845—6) p. 51; ZOLL. in Nat. en Gen. Arch. II (1845) p. 6; id., Syst. Verz. 2. Heft (1854) p. 130; MIQ., Fl. Ned. Ind. II (1857) p. 627; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 223; CURTIS in Journ. Straits As. Soc. (1893) p. 121; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 227, excl. syn. L.; COOKE, Fl. Bombay II (1905) p. 230; GAMBLE, Fl. Pres. Madras V (1923) p. 923 — *Breweria Roxburghii* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 493; id. in DC., Prodr. IX (1845) p. 438; WIGHT, Ic. IV, 2 (1850) p. 13, t. 1370; MIQ., Fl. Ned. Ind. II (1857) p. 627; THWAITES, Enum. Plant. Zeyl. (1864) p. 213 — *Breweria madagascariensis* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 493, nomen; id. in DC., Prodr. IX (1845)

p. 438 — *Breweria semidigyna* (ROXB.) O. K., Rev. Gen. (1891) p. 440 (*Brewera s.*).

Description of typical specimens (see further under Remarks):

A high climber, to 15 m. Stems stout, terete, covered with a dense, brown or reddish-brown tomentum, the upper flowerbearing parts 2.5—4 mm in diam. Leaves broad- to narrow-ovate, short-acuminate to cuspidate, the acumen with an acute or obtusish, mucronulate apex; broadly cordate or rarely truncate at the base, 6.5—15 cm long, 4—10 cm broad, tomentose on both sides, below more densely and softly than above, the upper surface glabrescent or at last sometimes glabrous; lateral nerves 5—6 pairs; petiole 18—35 (—60) mm, tomentose like the stems. Peduncles axillary, terete or more or less applanate above, variable in length, 4—14 cm long, tomentose; the flowers in a 2—5-flowered umbellate cyme at their end; bracteoles at the base of the primary branches of the cyme small or larger and leaf-like, and then to 2 cm long, pedicels variable in length, 4—15 mm long, short-tomentose. Sepals short-tomentose, 8—14 mm long, the two outer ones herbaceous, ovate or ovate-oblong, acute to acuminate, mostly with waved or reflexed margin, the three inner ones broad-ovate, acute or acuminate, herbaceous with narrow scarious margin, all about equal in length or the inner ones a little shorter. Corolla white, often blue in dry specimens, campanulate to funnel-shaped, 3—4(—5) cm long, the midpetaline areas pilose outside, the other parts glabrous; inside glabrous or with some hairs below the place of insertion of the filaments. Filaments inserted about 5—6 mm above the corolla base, sparsely short-pilose near their base, 8—12 mm long; anthers directed downwards. Ovary hairy; style 2-partite, with some hairs near the base; stigmas globose-peltate. Capsule broad-ovoid to subglobular, hairy at the top, about 12 mm high, 2-celled, 4-seeded, 4-valved, the valves longitudinally splitting into several narrow strips, which are often connate at the top. Seeds black, glabrous, 5.5—6 mm high, with 2 sides plane and one side convex.

MALAY PENINSULA, Kelantan, riverside, HANIFF and MD. NUR, Singapore Field nr. 10063, Jan. 1923 (B, K, S); Kota Bahru, RIDLEY s.n., Febr. 1917 (K); Labu laut, March 1914, GIMLETTE s.n. (K); Perlis, HENDERSON, Singapore Field nr. 22858, Nov. 1929 (B); id. id. 23086 (B, S); Prov. Wellesley, Kubang Ulu, CURTIS s.n., Febr. 1890 (S); Muda river, BURKILL 3075, Jan. 1918 (M, S); Penang, WALLICH 1405b (K, herb. BENTH.); id. 1405.2 (K, herb. HOOKER), leg. PORTER (K; according to HALLIER (1897) also in BD, C, Munich and Genève); Tanjong Bunga, CURTIS 1066, Oct. 1886 (K, S); according to HALLIER (1896) and to PRAIN (1906) wild in the Botanic Garden of Penang, Oct. 1896; Penang, on the coast, CURTIS 1703, March 1889 (C); Pahang, Kuala Lipis, BURKILL and HANIFF 15681, Nov. 1924 (S); Perak, Ipoh, CURTIS 3166, Dec. 1895 (S).

SUMATRA, without exact locality, KORTHALS 48 and 170 (L).

JAVA, Bantam, near Panimbang, ZOLLINGER 1339, June 1843 (BD); Pasir Ajoenan, 150—200 m, BACKER 1944, June 1911 (B, mixed with *Merremia umbellata* (L.) HALL.F.); Bodjangmanik, KOORDERS 40793 β (B); id., KOORDERS 41560 β, June 1912 (B); Batavia, Kandang Sapi, KORTHALS s.n. (L); Buitenzorg, Buitenzorg, BLUME s.n. (L, *type of Breweria cordata* BL.); id., BOERLAGE s.n. (L); id., WARBURG 2372bis (M); id., Tagal sapi, 240 m, BAKHUIZEN VAN DEN BRINK fil. 1622, Aug. 1922 (B); id., hedges along road to Kota batoe, HALLIER 204b, March 1893 (B); id., id., HALLIER 204c, Oct. 1894 (B); id., behind Desa Panaragan, banks of Tjidani, HALLIER 204a, March 1893 (B); id., along road near Tjipakoe, in *Tetracera* thickets, HALLIER 204d, Aug. 1896 (B, L); hills south of Djasinga, in second. forest, 250 m, BACKER 26030, Sept. 1918 (B, L); Barengkok, West of Leuwiliang, common, 250 m, BAKHUIZEN VAN DEN BRINK fil. 770, June 1921 (B, BD, K, L, M, P); cultivated in the Botanical Garden at Buitenzorg n. X F 75 (L); X F 79 (L); XV H 22 (B); HALLIER C 18a, May 1893 (L); HALLIER C 18b, May 1893 (L); HALLIER C 18c, May 1895 (L); WARBURG 1555 (M); WARBURG 1553bis (M); Priangan, Palaboehanratoe, beach near Tjidoean, KOORDERS 34664 β, Apr. 1899 (B); Parakan Teloe near Panjindangan, 600 m, common, BAKHUIZEN VAN DEN BRINK 59, May 1907 (B); hills south of Tjibeber near Tjiandjoer, 600 m, margin of second. forest, BACKER 13426, May 1914. Java, without exact locality, KORTHALS 226 (L).

BORNEO, without exact locality, BECCARI 3053 (P); Sarawak, Baram district, Baram mouth, HOSE 27, Dec. 1894 (BD).

CELEBES, Celebes and Dependencies, without exact locality, RACHMAT 172 (exped. VAN VUUREN) (B).

PHILIPPINE ISLANDS, Culion, on dry places, MERRILL 538, Dec. 1902 (BD, M); in dry thickets, MERRILL 618, Jan. 1903 (BD, M).

Distribution: Madagascar, British India, Indo-China, Malay Peninsula, Malay Archipelago, Philippines.

Vernacular name: aroj baloe (Sund., KOORDERS).

Remarks. 1. The original specimens on which ROXBURGH based his *Convolvulus semidigynus*, were cultivated in the Botanic Garden at Calcutta, raised from seeds, collected in the Shree-nugur mountains by Captain HARDWICKE. I did not see ROXBURGH's specimens, but according to his description, the stems and leaves of them must have been covered by a dense and very soft indument. Specimens, which fully agree with ROXBURGH's description are preserved in the Kew Herbarium (WALLICH n. 1405—1 and 1405—2, the former from Sillet, the latter from Penang; duplicates of the WALLICH collection are preserved in several other herbaria). They show, especially on the lower leaf surface, a very dense tomentum of a beautiful reddish brown colour. Specimens with the same dense tomentum occur in the Malay Archipelago; a fine example is BAKHUIZEN VAN DEN BRINK fil. n. 770 from Barengkok (Buitenzorg, Java), in the Buitenzorg herbarium, duplicates in BD, K, L, M and P.

2. Besides these typical specimens there are others showing a

pubescence of a much less density, and of a more or less paler colour changing from brown into grey, a character sometimes giving to the plant a rather different aspect. For two forms HALLIER proposed the names var. *ambigua* and var. *farinacea*, according to HALLIER both distinguished mainly on account of differences in the indumentum. Fine descriptions of these varieties, both made by HALLIER after living materials in the Botanic Garden at Buitenzorg may be found in Bull. Herb. Boiss. V (1897) p. 817 and 818.

The specimens on which HALLIER based his var. *farinacea* are indeed rather different from typical ones. They may be characterized in this way:

Var. **farinacea** HALL. f. in Verslag Plantent. Buitenz. 1895 (1896) p. 125; id. in Bull. Herb. Boiss. V (1897) p. 818, 1013; KOORDERS in Meded. 's Lands Plantent. XIX (1898) p. 546; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 508; HALL. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675 — *Lettsomia bancana* MIQ., Fl. Ned. Ind., Suppl. (1860) p. 561.

Not so densely tomentose as the typical form, but covered with short closely appressed hairs of a paler colour, especially the stems making the impression as being farinose. Finer venation of the sometimes narrower leaves often much more visible by the absence of a dense haircloth. Sepals often somewhat shorter, less acuminate, often with more distinct nerves. Corolla longer than is commonly found in typical specimens, 4.5—5 cm long.

The following specimens might be considered as var. *farinacea*:

BANGKA, without exact locality, HORSFIELD s.n., *type collection of Lettsomia bancana* MIQ. [L (a drawing after the specimen in U); U]; Lepar Islands, Poeloe Iboel, TEYSMANN s.n. (B).

CELEBES, Celebes and Dependencies, Bonto Parang, RACHMAT 4 (exped. VAN VUUREN), June 1913 (B, L); Bonto Djai, RACHMAT 21, June 1913 (B); Pangkadjene, on rocks, TEYSMANN 12197 (B); sandy beach near Pare-pare, KOORDERS 16559 β, May 1895 (B, BD, K, L); Pare-pare, near beach, KJELLBERG 4011, May 1929 (B).

MOLUCCAS, Ceram, W. Ceram, Poeloe Tikoes, beach vegetation, KORNASSI (exp. RUTTEN) 1274, May 1918 (B, L, U).

Specimens cultivated in the Botanic Garden at Buitenzorg under n. XV G 72 (B, L, U) belong here. Moreover specimens collected by HALLIER and by WARBURG in the same garden, HALLIER C 16a, May 1893 (L); HALLIER C 16b, June 1895 (L); WARBURG 1554 (M).

Vernacular names: akar lambai poetie (Bangka, Lepar Isl., TEYSMANN); tamber kaleleng (Celebes, RACHMAT).

Remarks. It is with some hesitation that I put the specimen from Ceram and that collected by RACHMAT under nr. 4 in Celebes under var. *farinacea.* There are, indeed, many points, which make it probable that we have to do here with true var. *farinacea* (for instance the general habit, the characters of the indument, the form of the leaves, the size of the corolla); but there are also some points of difference. The Ceram plants are, for instance, characterized by their long pedicels (to 20 or occasionally to 30 mm long), much longer than is generally found, whilst the RACHMAT specimen has the sepals of an aberrant form; they are not at all acuminate, but can be described as elliptic and obtuse. These plants might be of importance systematically and phytogeographically when more materials should be available and when the aberrant characters should prove to be constant ones.

The specimen on which MIQUEL based his *Lettsonia bancana* is also the base of HALLIER's var. *farinacea.* HALLIER first mentioned it under this variety (l.c., 1896, p. 125; l.c., 1897, p. 818); later he changed of opinion (l.c., 1897, p. 1013) and put it under var. *ambigua.* I agree with HALLIER's first opinion.

Var. **ambigua** HALL. f. in Bull. Herb. Boiss. V (1897) p. 817.

Concerning this var. can be stated that the specimens of it in the Leiden herbarium, all collected by HALLIER in the Buitenzorg Garden from one plant, fully agree with HALLIER's fine descripion (l.c.).

It is, however, more difficult to draw a satisfactory line between the typical form and this variety, than it was in var. *farinacea.* It is not impossible that HALLIER is right in supposing that we have to do here with a hybrid.

Specimens, all collected from the same plant, cultivated at Buitenzorg in the Botanic Garden under n. X F 75A, *type number of var. ambigua* (the type is in Munich): HALLIER C 17a, May 1893 (L); HALLIER C 17b, April 1893 (L); HALLIER C 17c, March 1893 (L).

V. NEUROPELTIS WALL.

WALL. in ROXB., Fl. Ind. II (1824) p. 43; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 491; id. in DC., Prodr. IX (1845) p. 437; MIQ., Fl. Ned. Ind. II (1857) p. 626; BENTH. et HOOK., Gen. Plant. II (1876) p. 878; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 224; BAILL., Hist. Pl. X (1891) p. 328; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 16; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 573; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 496, 508; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 80; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 296; GAGNEP. et COURCH. in

LEC., Fl. Indo-Chine IV (1915) p. 290; RIDLEY, Fl. Malay Penins. II (1923) p. 453.

Large, woody climbers with elliptic, ovate or oblong, chartaceous or coriaceous, penninerved leaves. Flowers small, in rufous tomentose racemes, axillary or subpaniculate towards the ends of the branches. Bract small at first, adnate to the pedicel, in fruit much accrescent, broad-elliptic or orbicular, scarious, reticulately nerved; bracteoles minute, hairy. Sepals 5, imbricate, subequal, suborbicular, hardly enlarged in fruit. Corolla small, rotate to broad-campanulate, deeply 5-lobed, the lobes induplicate-valvate in bud. Stamens 5, glabrous or hairy at the base, adnate to the corolla-tube, exserted or included; pollen smooth. Ovary hairy, perfectly or imperfectly 2-celled, 4-ovuled. Styles 2, short. Stigmas 2, peltate, lobed or kidney-shaped, complanate. Capsule small, glabrous, 4-valved, 1-celled, 1-seeded. Seed black, smooth, opake.

Distribution: S.E. Asia (from Tenasserim and Indo-China to the Malay Peninsula); West Coast of British India (Kanara, Malabar); in the Malay Archipelago only known from Borneo (uncertain, see under *N. racemosa*); W. Tropical Africa from Upper Guinea to Portuguese Congo.

Key to the species.

a. Styles as long as or shorter than the breadth of the stigma. Corolla hairy at the base of the filaments . . . . 1. **N. racemosa**

b. Styles much longer than the breadth of the stigma. Corolla glabrous at the base of the filaments . . . . 2. **N. Maingayi**

1. **Neuropeltis racemosa** WALL. in ROXB., Fl. Ind. II (1824) p. 44; id., Cat. (1828) n. 1322; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 491, t. II, n. 12, rather bad; id. in DC., Prodr. IX (1845) p. 437; DELESS., Ic. Sel. V (1846) t. 96 (not seen); MIQ., Fl. Ned. Ind. II (1857) p. 626; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 225, p.p.; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 508, p.p.; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 297, p.p.; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 290, fig. 31, p.p.; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Number (1921) p. 507; RIDLEY, Fl. Malay Penins. II (1923) p. 453, p.p. — *? N. intermedia* GRIFF., Notul. Pl. Asiat. IV (1854) p. 285 — *? N. bracteata* GRIFF., Notul. Pl. Asiat. IV (1854) p. 285.

A large woody climber, the young branches more or less tomentellous with rusty brown hairs, the adult ones glabrous, terete, to 5 mm in diam., pale brownish-grey or ash-coloured, often with numerous elevated whitish lenticels. Leaves elliptic or narrow-elliptic, sometimes elliptic-oblong, acute or short-acuminate at the apex with blunt, mucronulate top, acute at the base or short-attenuate into the petiole, coriaceous, the upper surface often with numerous, very minute, impressed dots, glabrous above and beneath or with a few scattered appressed hairs, (6—)8—12 cm long, (2—)3.5—6(—7) cm broad; midrib impressed above, prominent beneath, lateral nerves (7—)8—10 on each side of the midrib, arcuately connected at some distance from the margin, slightly prominent above, and often grooved, distinctly prominent beneath, finer reticulate nervation distinctly visible above, less visible beneath, only the stronger nerves more prominent here, petiole 1—1.5 cm long or slightly longer, with a groove above, near the leafbase. Inflorescences from the leaf axils or from bare, already leafless branches, racemose, solitary, or 2—4 together, brown-tomentose, shorter than the leaves, 3—6 cm long or slightly longer; pedicels short, 2—2.5 mm long; bract immediately below the sepals, adnate to the pedicel, ovate to ovate-lanceolate, with a distinct mucro, 2—3 mm long, much accrescent in fruit and then broad-elliptic to orbicular, slightly emarginate and minutely mucronulate at the apex, slightly emarginate or obtuse at the base, bearing the calyx with capsule a little below its centre, scarious, finely reticulately nerved, glabrous, except along the pedicel and sometimes along the nerves, 3—4.5(—6) cm long; bracteoles minute, in fruit immediately below the calyx, subulate, densely hairy. Sepals imbricate, tomentose outside, glabrous inside, the two outer ones orbicular or slightly broader than long, 2—2¼ mm long, the three inner ones broader than long, 1¾—2 mm long, with scarious margins, the sepals scarcely enlarged in fruit. Corolla broad-campanulate, about 5 mm long, deeply 5-lobed, the lobes longer than the tube, with incurved, obtuse top, pilose outside, distinctly nerved, the tube inside hairy at the base of the filaments. Stamens inserted a little below the sinus of the corolla, filiform, shorter than the corolla; anthers oblong, with sagittate base. Ovary ovate, hairy, styles 2, short, shorter than or as long as the breadth of the irregularly lobed, more or less kidney-shaped, 1 mm broad stigma. Capsule nearly globose, glabrous, about 3.5—5 mm high, 4-valved, 1-celled, 1-seeded; seed subglobose, smooth, black.

Malay Peninsula, P. Penang, Wallich 1322/1, collected by W. Jack (BD, K, *type*; L, P, S); Haniff s.n. (K, M); Haniff 137, Jan. 1928 (M); Penàra Bukit, Guard 12715, Febr. 1905 (B, K, S); Waterfall gardens, Haniff s.n., June 1915 (S); Kedah, Dohnan, Forest Department 21518, Jan. 1930 (S); Weng Rd, near Baling, Best, Singapore Field n. 21270, Nov. 1929 (B, S); Kulim, Haniff, Singapore Field n. 1270, June 1917 (K); Kedah Peak, Sunling, Bell and Haniff s.n., March 1911 (K).

Borneo, Bandjermasin, Motley 1209 (K). With doubt the specimen collected by Motley is mentioned here. It is the only number known from the Malay Archipelago. Was it perhaps a cultivated specimen or have we to do with a confusion of labels?

Vernacular names: akar semting semang (P. Penang, Guard); perot ayam (Kedah, Dohnan).

Distribution: The species seems to be restricted to Tenasserim and the N.W. part of the Malay Peninsula (Kedah, P. Penang). I did not see specimens from the southern part of Siam, but probably the species may be found there too. For the occurrence of the species in Borneo see above.

Remarks. *N. racemosa* has always been confounded both in literature and in herbaria with the second species known from the Malay Peninsula, viz. *N. Maingayi,* from which species it can be separated by several well-defined characters (see, for instance, the key to the species).

To the synonyms I put two names of Griffith, *N. intermedia* and *N. bracteata,* both with the addition of a note of interrogation. I did not see the specimens on which Griffith based his descriptions (from Mergue, Tenasserim); these descriptions are rather short and incomplete, but on account of the fact that in both Griffith describes the filaments as being hairy at the base, it is possible that Griffith's plants belong to *N. racemosa.* As a third synonym we often find *N. ovata* Wall. I could examine in several herbaria (BD, K, P, S) the plants on which Wallich based this species (from Amherst, Tenasserim). It is represented there by leafy branches with mature fruits or by fruits only. The form of the large elliptic, scarious bract, which is not cordate, but rounded at the base, and also rounded at the apex, leads me to keep this species separate.

2. Neuropeltis Maingayi Peter, ex Hall. f. in Engl. Bot. Jahrb. XVI (1893) p. 500, in obs., nomen [1]) — The name *N. Maingayi* without the addition of an author's name has been used already by Schlepegrell in Bot. Centralblatt XLIX (1892) p. 296, very probably on account of a specimen labelled by Peter.

A large woody climber, to 30 feet high (King's collector), the young branches rusty-tomentellous, the adult ones glabrous, terete, to 6 mm in diam., brown to purple-brown, often with white lenticels. Leaves elliptic to narrow-elliptic, short- to long acuminate at the apex with acute or obtusish, mucronate to subulate top, acute or obtuse at the base, coriaceous, glabrous or nearly so above and with few scattered, appressed hairs beneath, glabrescent, 6—11(—13) cm long, (2.5—)3—4.5(—6) cm broad, midrib impressed above, prominent beneath, lateral nerves 6—9 on each side of the midrib, impressed above, prominent beneath and arcuately connected at some distance from the margin, the finer nervation not so distinctly visible above as in *N. racemosa*, not or hardly prominent or more or less impressed above; only the stronger veins prominent beneath, equally as in *N. racemosa*; petiole 10—13(—22) mm long, with a longitudinal groove above, at first tomentellous, glabrescent. Inflorescences from the leaf axils, one or few from an axil, racemose, occasionally ramified and then paniculate, brown-tomentose, 3—10 cm long; pedicels short, to 3 mm; bract inserted immediately below the sepals, adnate to the pedicel, ovate to ovate-lanceolate with a distinct mucro, about 3—4.5 mm long, much accrescent in fruit and than broad-elliptic, obtuse or emarginate and mucronulate at the apex, slightly cordate at the base, bearing the calyx with capsule below the middle, scarious, finely reticulately nerved, sparsely pubescent on both sides, glabrescent, about 4—4.5 cm long. Sepals imbricate, tomentose outside, glabrous inside, 2—2.5 mm long, the two outer ones orbicular, the three inner ones broader than long, with scarious margins, the sepals scarcely enlarged in fruit. Corolla broad-campanulate to rotate, about 5—5.5 mm long, to 10 mm in diam., probably larger than in *N. racemosa,* deeply 5-lobed, the lobes longer than the tube, pilose outside, distinctly nerved; tube inside glabrous at the base of the filaments. Stamens inserted a little below the sinus of the corolla, filiform, shorter than the corolla. Ovary globose, hairy; styles 2, longer than in *N. racemosa,* 1¼—2 mm, longer than the breadth (½—¾ mm) of the kidney-shaped, few-lobed stigma. Capsule ovoid, glabrous, about 6 mm high, 4-valved, 1-celled, 1-seeded. Seed ovoid to globular, smooth, black.

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[1]) A *N. racemosa* praecipue differt foliorum nervis minoribus supra minus prominulis vel impressis, corolla ad basin filamentorum glabra, stylis valde longioribus latitudine stigmatis, fructu paulo majore, ovoideo, circ. 6 mm longo.

MALAY PENINSULA, without exact locality, STOCKS (K); SCORTECHINI 2071 (S); Perak, Larut, dense jungle, within 100 ft., Dr KING's collector 6809, Nov. 1884 (BD, K, L, P); Gopeng, 500—800 ft., Dr KING's collector 4370, June 1883 (K), Selangor, Klang Gates, HUME 7304, May 1921 (S); Sungei Buloh, SYMINGTON, Forest Department 21079, Nov. 1929 (S); Malacca, MAINGAY 1152 (BD, *type*, this specimen is numbered 1152 and 1973 A and bears fruits and flowers; a fruiting specimen in K is also numbered 1152 and 1973 A, another, flowering one bears the number 1973 B; the specimen in L is numbered 1152); MERLIMAN, watchman CANTLEY's, s.n., June 1886 (S); Batu ampur, GOODENOUGH 1988, June 1894 (K).

Distribution: Malay Peninsula, Indo-China (?, see under remarks).

Vernacular names: bungah jonkal (Malacca, MERLIMAN); akar oran merah (Malacca, GOODENOUGH).

Remarks. The name of this species has been given by PETER to the specimen MAINGAY 1152 in the Berlin Herbarium, when studying the Convolvulaceae for ENGLER-PRANTL's Natürliche Pflanzenfamilien. In HALLIER's paper on this family (1893) the name occurs as a *nomen nudum*. The species has been lost sight of for several years because the authors working on Indian Convolvulaceae did not distinguish it from *N. racemosa*. A comparison of the flowers of WALLICH's type of *N. racemosa* with those of PETER's plant leads me to keep the two species distinct. I wish to maintain the epithet *Maingayi*, correctly given by PETER and have added in order to validate this name, a Latin differential diagnosis to the English description of the species.

The corolla is white with a red tinge and the calyx is of a rich brown colour (KING's collector 6809) or the flowers are darkish red (KING's collector 4370).

In specimens secured by KING's collector under n. 6809 the leaves are broad-elliptic with obtuse, shortly cuspidate apex; they seem to be more or less bullate, and are described as to be of a rich glossy deep green. In KING's collector 4370 they are of a middle green.

I am not quite certain that the specimens from Indo-China are fully identic with those from the Malay Peninsula. A more detailed study of materials from Indo-China may clear up this question.

Besides the typical specimens with sparsely hairy or glabrous leaves there are others with a densely rufous- or ferrugineous-tomentose lower leaf surface:

var. **tomentosa** Van Ooststr., nov. var.

Differt foliis subtus dense rufo- vel ferrugineo-tomentosis.

MALAY PENINSULA, Malacca, MAINGAY 1153 (L, *type*). 2 sheets in K, one bearing the numbers MAINGAY 1153 and 1953, collected on June 7, 1865 or 1866, the other bearing the numbers MAINGAY 1153 and 1953 A, collected in 1867 or 1868; Pahang, Raub, BURKILL and HANIFF 938, Nov. 1924 (B, K, S).

Distribution: Malay Peninsula.

Remarks. The flowers of the specimen BURKILL and HANIFF 938 are white, according to a note on the label.

VI. PORANA BURM. f.

BURM. f., Fl. Ind. (1768) p. 51, t. 21*, fig. 1; BLUME, Bijdr. (1825) p. 723; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 487; id. in

DC., Prodr. IX (1845) p. 436; MIQ., Fl. Ned. Ind. II (1857) p. 625; BENTH., Fl. Austr. IV (1869) p. 434; KURZ in Journ. Bot., New Ser. II (1873) p. 136; BENTH. et HOOK., Gen. Plant. II (1876) p. 876; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 221; BAILL., Hist. Pl. X (1891) p. 326; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 24; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 575; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 497, 508; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 84; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 296; KOORDERS, Exk. fl. Java III (1912) p. 114; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 292; RIDL., Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 358 (*Porania*); BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 512 — *Dinetus* BUCH.-HAM. ex D. DON in SWEET, Brit. Fl. Gard. II (1825) t. 127 — *Duperreya* GAUDICH. in FREYC., Voyage autour du monde, Bot., (1826) p. 452, t. 63; CHOISY in Mém. Soc. Phys. Genève VIII (1839) p. 44; id. in DC. Prodr. IX (1845) p. 436.

Tall twiners with slender, woody or herbaceous stems. Leaves herbaceous, mostly cordate at the base and palmately nerved, rarely penninerved. Inflorescences racemose or paniculate, rarely flowers solitary. Bracts leaf-like or subulate or none; bracteoles subulate or none. Sepals 5, small in flower, the 3 outer ones or all much accrescent in fruit, scarious, patent, often spathulate. Corolla mostly white, small, campanulate or funnel-shaped, rarely larger, salver-shaped, the limb plicate, the lobes patent. Filaments 5, filiform, included, rarely exserted, glabrous or glandular or pubescent at the base; anthers oblong or linear; pollen smooth. Ovary mostly glabrous, 1-celled, 2-ovuled or 1- or 2-celled, 4-ovuled. Style 1, entire or divided into two unequal branches; stigma globose, single or one on each branch. Disk annular or none. Capsule small, subglobose, usually 1-seeded, indehiscent or 2-valved. Seed glabrous; cotyledons plicate.

Distribution: More than 20 species, for the greater part in tropical and subtropical Asia, 3 species in Africa and adjacent islands, 1 species in Australia and perhaps 1 species in America.

Remarks. PETER divided the genus into three sections, according to this author distinguished as follows: 1. *Euporana* PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 24, with a 2-fid style, 5-lobed, campanulate corolla and flowers in panicles; this section is represented in Malaysia by *P. volubilis* BURM. f.; 2. *Duperreya* (GAUD.) PETER l.c., p. 24, with entire style, solitary, campanulate flowers and narrow leaves; not in Malaysia; 3. *Dinetus* (BUCH.-HAM.) PETER l.c., p. 25, with entire style, funnel-shaped flowers, several-flowered inflorescences and cordate leaves; represented in Malaysia by *P. racemosa* Roxb. and by the often cultivated *P. paniculata* Roxb.

Key to the species.

1a. Style one, entire. Stamens included in the corolla 2
b. Style 2-fid to the middle. Stamens exserted. 5 sepals enlarged in fruit . . **1. P. volubilis**
2a. Style very short, as long as or shorter than the ovary. Corolla superficially lobed or subentire. Stamens inserted in the corolla tube at about the same height. 3 sepals enlarged in fruit . . . . **2. P. paniculata**
b. Style longer than the ovary. Corolla deeply 5-lobed. Stamens not inserted at the same height in the corolla tube. 5 sepals enlarged in fruit . . . **3. P. racemosa**

1. **Porana volubilis** Burm. f., Fl. Ind. (1768) p. 51, t. 21*, fig. 1; Bl., Bijdr. (1825) p. 723; Roxb., Fl. Ind. II (1824) p. 40; id., I (1832) p. 465; Blanco, Fl. Filip. (1837) p. 88; id., ed. 2 (1845) p. 64 (not seen); id., ed. 3, I (1877) p. 119; Choisy in Mém. Soc. Phys. Genève VI (1833) p. 488; Wight, Icon. II (1843) t. 347; Choisy in DC., Prodr. IX (1845) p. 436; Wight, Ill. Ind. Bot. II (1850) t. 168b, fig. 8; Zoll., Syst. Verz. 2. Heft (1854) p. 130; Miq., Fl. Ned. Ind. II (1857) p. 625; id., Suppl. (1860) p. 235; Kurz in Journ. Bot., New ser. II (1873) p. 137; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 222; Forbes, Wander., Germ. ed. II (1886) p. 222; Vidal y Soler, Rev. Plant. Vasc. Philipp. (1886) p. 197; Hall. f. in Versl. 's Lands Plantent. 1895 (1896) p. 125; id. in Bull. Herb. Boiss. V (1897) p. 382; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 508; Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 63 (as *Porania volubilis* Blanco); Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 296; Hall. f. in Meded. Rijks Herb. Leiden 12 (1912) p. 14; Koorders, Exk. fl. Java III (1912) p. 114; Koorders-Schum., Syst. Verz. (1910—13), Conv. p. 1; Gagnep. et Courch. in Lec., Fl. Indo-Chine IV (1915) p. 295; Bold., Zakfl. Java (1916) n. 839; Merrill, Spec. Blanc. in Bur. of Sc. Publ. 12 (1918) p. 320, as to the name only; see remarks; id. in Philipp. Journ. Sc. XIX (1921) p. 373 (*Porania*); id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 507 (*Porania*); Gamble, Fl. Pres. Madras V (1923) p. 921; Ridley, Fl. Malay Penins. II (1923) p. 463; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 358 (*Porania*); Heyne, Nutt. Pl. ed. 2 (1927) p. 1298; Henderson in Gardens' Bull., Str. Settlem. IV (1928) p. 293; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 512; Costerus and

SMITH in Ann. Jard. Bot. Buitenz. XLII (1932) p. 11; MERRILL in Contr. Arn. Arbor. VIII (1934) p. 145 — *P. volubilis* BURM. f. var. *Burmanniana* BL., Bijdr. (1825) p. 723; MIQ., Fl. Ned. Ind. II (1857) p. 626; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 508.

A large woody climber, up to 20 m high (BACKER) with stems to 1 or 2 cm thick, the adult branches pale brown or grey, 2—3, occasionally to 6 mm thick, often minutely verrucose; the young parts with short appressed hairs. Leaves ovate, short- or long-acuminate with obtuse or slightly emarginate acumen, mucronulate; broadly rounded or slightly cordate at the base, sometimes abruptly decurrent at the petiole, glabrous or only with a few hairs on the nerves and along the margins, often shining above; pinnately nerved, lateral nerves 5—7 at both sides, venation reticulate. Length of the leaves 3—9 cm, width 2—6 cm; petiole much shorter than the blade, glabrous or hairy above, 1—3 cm long. Flowers fragrant, in often dense lateral and terminal inflorescences, often forming large, broad panicles, which are leafy below. Peduncles and pedicels densely appressed-pilose; the pedicels about 3—5 mm long. Sepals oblong to obovate, obtuse, about 4—5 mm long, glabrous except some hairs at the top and near the base, or sparsely pilose on the whole surface, all accrescent in fruit and then patent, scarious, reticulately nerved, and with 7—8 stronger longitudinal nerves, oblong to spathulate, or obovate, 7—10 mm long. Corolla white, 8—10 mm long, glabrous or the midpetaline areas short-pilose, deeply 5-lobed, the lobes obtuse, spreading. Stamens 5, much unequal in length, the filaments filiform, glabrous, much longer than the anthers, inserted near the corolla base, exserting. Ovary glabrous, globular; style 2-fid to the middle, the branches filiform, unequal; stigmas globular. Disk present. Fruit broad-ovoid to globular, mucronulate, 3—4 mm in diam., glabrous, 1-seeded. Seed ovoid, purple-brown or black, minutely verrucose, about 2—2.5 mm long.

MALAY PENINSULA, Malacca, GRIFFITH s.n., (BD, K); id., in hedges, GRIFFITH cat. 5874/1 (K, P); according to RIDLEY the specimens collected by GRIFFITH from hedges in Malacca are certainly not wild there; RIDLEY states that this species is commonly cultivated in gardens. Singapore, Singapore, cultivated in the Botanic Gardens, MD. NUR, Dec. 1929 (S); id., FURTADO, Nov. 1927 (S); Singapore, without precise locality, Schlesisch botanischer Tauschverein 887, Oct. 1896 (B, M).

SUMATRA, according to MERRILL, 1934, in Atjeh, near Bireuen, sea level, BANGHAM 657, Jan. 1932 (cult.?); East Coast, Tandjoeng morawa, cult. and escaped from culture, LÖRZING 4263, March 1916 (B).

JAVA, without precise locality, BLUME? 98 (L); JUNGHUHN 50 (L); Plant. Junghuhn. ined. 537 (K); LA HAYE 45 (P); LESCHENAULT s.n. (P); HORSFIELD, Conv. 25 (K); Lobb s.n. (K); Millet s.n. (K); Nagler 179 and 180 (BD); de Vriese s.n. (K, L); the *type* is a specimen from Java, collected by Kleinhof (not seen); Bantam, S.-coast, Junghuhn (L); Batavia, several specimens without collector's name (L); Backer s.n., Aug. 1904 (L, M); between Batavia and Weltevreden, Goenoeng Sahari Sentiong, Chinese cemetary, Backer 32659, June 1903 (B); id., Backer 32660, July 1903 (B); between Weltevreden and Tandjong Priok, Kliphof, Pepanggo, on dry soil inside the mangrove vegetation, Backer 32661, Aug. 1904 (B); Weltevreden, Selipi, Backer 32658, May 1903 (B); N. of Weltevreden, Chinese cemetary, Hallier s.n., Aug. 1896 (B); Kebajoran, S.W. of Weltevreden, Backer 32662, Sept. 1904 (B); N. of Pesing, on bushes in the alang fields, Backer 32663, Sept. 1904 (B); Buitenzorg, Pangipison, foot of G. Sanggaboewana, bank of Tji Beët, van Steenis 5329, June 1933 (B); cultivated in the Botanic Garden, Buitenzorg, X. F. 39a (L, M); XV. K. B. XI. 5; XV. K. B. XII. 7; XVI. A. 8 (B); id., Teysmann (BD, L); id., Warburg 1577 (BD); id., Warburg 1577 bis (M); cultivated in private gardens (B); Priangan, Bandoeng, cultivated, Jacobson 223 (B); Tegal, forestry E. Tegal, in teak-woods, Beumée 4480, Sept. 1919 (B); Pekalongan, Dara, Docters van Leeuwen 468, May 1912 (B); forestry Margasari, teak-woods on red volcanic soil, 100 m, Beumée 5187, June 1920 (B); Soebah, 50 m, Koorders 22445 β, May 1896 (B, L); id., Koorders 27603 β, April 1897 (B, L); id., Koorders 27604 β, April 1897 (B, K, L); id., Koorders 36856 β, May 1899 (B, BD); on red volcanic soil in teak-woods, 150 m, Wolff v. Wülfing 4238, June 1919 (B); Bagelen, Keboemen, cultivated, Brinkman 476, July 1931 (B); Semarang, near Semarang, herb. Houttuyn (L); Bangkong, Docters van Leeuwen s.n., Aug. 1909 (B); between Welèri and Soebah, margin of forest, Backer 16581, Sept. 1914 (B); foot of G. Oengaran, Junghuhn s.n., Apr. (L); Kedoe, Magelang, cultivated, 380 m, van Oosten 2, July 1920 (B); Jogjakarta, G. Prambanan, Plant. Junghuhn. ined. 11537 (L); Rembang, forestry Balo, teak-woods on limestone and on marl, 50—150 m, Beumée 5528, Jan. 1921 (B); forestry Banglean, teak-woods on marl, 100 m, Beumée 988, Aug. 1917 (B); forestry Nanas, teak-woods on marl, margin of wood, 100 m, Beumée 849, June 1917 (B); forestry Ngliron, teak-woods on marl, margin of wood, 100 m, Beumée 915, June 1917 (B); Madioen, Kendeng, 100—150 m, Elbert 367 (L); Trinil, Elbert 366 (L); Babadan, 80 m, Wisse 439, May 1921 (B); Kediri, N.E. spur of G. Klotok, near Kediri, 100 m, Kramer 7, Febr. 1922 (B); Gadoengan Pare, Koorders 22990 β, June 1896 (B, K, L); Soerabaja, Soerabaja, Boorsma s.n. (B); Pasoeroean, Djatiroto, Backer 7977, May 1913 (B); G. Semongkrong, on dry volcanic soil, Backer 7765, May 1913 (B); Probolinggo, G. Bentar, Backer 24333, June 1918 (B); Bondowoso, near Soemberwaroe, in forest, Zollinger 2790 (BD, K); Ringgit, Clason D 7, May 1931 (B); Ardjasa, 10 m, teak-woods, Backer 24750, June 1918 (B); Pradjekan, 50 m, Backer 24581, June 1918 (B); Djember, Djember, 85 m, Ultée 6 (B); Poeger, Backer 18258, Dec. 1914 (B); Poeger-Watangan, 10 m, Koorders 21329 β, Oct. 1895 (B, BD, L); Balambangan near Banjoewangi, Rant s.n., June 1931 (B); Madoera, Kangean Archipelago, Kangean, Kolo kolo, Dommers 20, Sept. 1919 (B); id., S.E. of Kali Sangken, 40 m, Beguin D 4, Sept. 1919 (B); id., Pabean, 2 m, Beguin J 3, June 1919 (B); id., Pandeman, 60 m, Beguin Q 2, June 1919 (B).

Borneo, without precise locality, Korthals 161 (L); S. and E. division, Bandjermasin, Motley 175 (K); Martapoera, Korthals 49, 160 (L); British

North Borneo, Kudat, Mt. Kinabalu, CLEMENS 9533, Dec. 1915, cultivated according to MERRILL, 1921 (B, K).

CELEBES, without precise locality and without collector's name (L, named var. *Burmanniana* in BLUME's handwriting); Celebes and Dependencies, Makassar, Mrs. BOUMAN-HOUTMAN 7, July 1925 (B).

SOEMBAWA, Loentoeng andang, COLFS 158, Nov. 1879 (L).

TIMOR, without precise locality, CURTIS s.n. (K); REINWARDT s.n., Apr. 1821 (L); herb. RICHARD (P); a specimen from herb. Paris (L); WALSH 441 (B); ZIPPELIUS s.n. [named *P. Burmanniana* BL. by BLUME, an unpublished name; probably the type of var. *Burmanniana* BL. (L)]; West Timor, Benoe, 400 m, Mrs. BOUMAN-HOUTMAN 100 (B); Koepang, TEYSMANN 441 (K, L); TEYSMANN 11291 (B); LE GUILLOU, Ao. 1841 (Voyage de l'Astrolabe et de la Zélée) (P); NAUMANN, May 1875, labelled var. *microcarpa* ENGL. (BD); S. Middle Timor, Niki-niki, 750 m, WALSH 303, May 1929 (B); Portuguese Timor, Liquica, sea level, NEWTON s.n. (K).

AMBOINA, Amboina, cult., ROBINSON 1821, Sept. 1913 (M).

PHILIPPINE ISLANDS, Luzon, Prov. of Abra, RAMOS, Bur. of Sc. 7246, Jan.-Febr. 1909 (B); id., Bucay, MICHOLITZ s.n., Dec. 1882 (K); Prov. of La Union, VIDAL 1165, Nov. 1884 (K, L); id., LETE 223, Nov. 1916 (M); id., Bauang, FÉNIX, Bur. of Sc. 12952, Dec. 1910 (B, BD, K, L); Benguet Prov., M. RAMOS, Bur. of Sc. 5339, Dec. 1908 (BD, L, M); Prov. Manila, San Mateo, VIDAL 3362, March 1886 (K). According to MERRILL, 1923, in thickets at low and medium altitudes.

BISMARCK ARCHIPELAGO, New Ireland, PEEKEL 61; wild? v. O. (B).

Distribution: From Burma and Indo-China to the Malay Archipelago and the Philippines; in the Malay Peninsula only as a cultivated plant; according to GAMBLE (1923) common in gardens on both sides of the India Peninsula.

Vernacular names: bruidsbloemen (Dutch, HEYNE), schildersverdriet, witte bruidstranen (Dutch, BACKER), bridal wreath (RIDLEY), white corallina (HEYNE), wedosari, widasari, widosari, widasantoen, bidasari (Jav., BACKER, HEYNE, KOORDERS), plilitan, angkeb (Jav., KOORDERS), aroes aroesan (Jav., KRAMER), bidhasarè (Madur., BACKER, HEYNE), widosari (Kangean, DOMMERS), bila sarè (Kangean, BEGUIN), bunga nasi (Amboina, ROBINSON), noeit (Timor, WALSH), kalabanog, kamuras (Philipp.: Iloko language, MERRILL), bulacan (Philipp., BLANCO, MERRILL).

Use: Cultivated in gardens for its flowers. According to HEYNE, who takes his data from VORDERMAN (Madoereesche planten, n. 36), a decoction is used in stimulating the afterbirth. BOORSMA states that the leaves represent one of the ingredients used in pressing *djamoe bagolan* in the Principalities. The plant is eaten in the Principalities against an unpleasant taste.

Remarks. 1. The specimens from Timor on which BLUME based his var. *Burmanniana*, have the leaves longer acuminate than those, which BLUME named typical *P. volubilis*. There is, however, not the slightest reason to distinguish this variety as it falls fully within the variability of the species.

2. The specimen mentioned by MERRILL (1918) as being an illustrative one for BLANCO's interpretation of *P. volubilis*, belongs to *Rivea corymbosa* (L.) HALL. f.

3. Some of the specimens from the Philippines have the sepals slightly broader than is commonly found.

4. COSTERUS and SMITH, 1932, give a description of a witches' broom found in Bondowoso, Java by ETTY, June 1930.

5. According to BACKER in Java below 200 m altitude especially in M. and E. Java, in parts with strong east monsoon, flowering from May to September.

2. **Porana racemosa** ROXB., Hort. Beng. (1814) p. 13, nomen; id., Fl. Ind. II (1824) p. 41; WALL., Cat. (1828) n. 1326; ROXB., Fl. Ind. I (1832) p. 466; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 489; id. in DC., Prodr. IX (1845) p. 436; ZOLL., Syst. Verz. 2. Heft (1854) p. 130; WIGHT, Icon. IV (1850) t. 1376; id., Ill. Ind. Bot. II (1850) t. 168b, fig. 9; MIQ., Fl. Ned. Ind. II (1857) p. 626; KURZ in Journ. Bot., New Ser. II (1873) p. 137; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 222; FORBES, Wander., Germ. ed. II (1886) p. 222; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 24, fig. 11 A, B; BOERL., Handl. Fl. Ned. Ind. (1899) p. 508; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 103; KOORDERS, Exk. fl. Java III (1912) p. 114, 115; KOORDERS-SCHUM., Syst. Verz. (1910—13), Conv. p. 1; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 294; BOLD., Zakfl. Java (1916) n. 839 — *P. cordifolia* LEDEB., Ind. Hort. Dorpat. (1824) Suppl. 6 (not seen) — *P. dichotoma* HAM. ex DON, Prodr. Flor. Nepal. (1825) p. 99 — *Dinetus racemosus* (ROXB.) SWEET, Brit. Flow. Gard. II (1825) t. 127; id., Hort. Brit., ed. 1 (1827) p. 289 (not seen) — *P. elegans* ZOLL. in Nat. en Geneesk. Arch. II (1845) p. 571.

Stems herbaceous, terete, twining, up to 10 m high (KOORDERS), more or less hirsute or glabrous, in the first case minutely verrucose by the thickened bases of the hairs, the older parts striate, to 2 or 3 mm thick. Leaves petiolate, petiole slender, patently pilose or almost glabrous, shorter than or as long as the blade; blade ovate to broad-ovate, deeply cordate at the base, short or long acuminate to caudate at the apex with blunt or acute, mucronulate tip, 2.5—10 × 2.5—7 cm, more or less densely pilose on both sides, beneath more densely than above, the hairs appressed, rarely the indument is densely pubescent to almost tomentose; palmately nerved with 7(—9) nerves from the base, nerves more or less prominent beneath. Inflorescences paniculate, axillary, more or less widely and racemosely branched, few- or many-flowered; the lower bracts of the inflorescences leaf-like, sessile or with a very short petiole, cordate at the base with stemclasping auricles, mucronate at the apex, glabrous or sparsely pilose, in fruit more or less papery; the upper bracts subulate; pedicels filiform, much longer than the sepals, glabrous or appressed pilose, 3—6, later up to 10 mm long. Calyx very small, the sepals equal, linear-lanceolate, 3-nerved, sparsely pilose, 1.5—2.5 mm long, accrescent in fruit and then linear-oblanceolate, obtuse and mucronulate at the apex, attenuate towards the base, scarious, reticulately nerved and with 3 longitudinal main nerves, up to 18 mm long, but often shorter, equal in length, with some white appressed hairs, especially near the base. Corolla white (limb pure white, tube pale yellow, Backer), funnel-shaped, about 1 cm long, 5-lobed to the middle, the lobes spreading, elliptic, rounded, mucronulate, glabrous. Stamens inserted at different height in the corolla tube, the filaments very short, shorter than the anthers, glabrous, not exserted. Ovary ovoid, glabrous, style 1, rather short, but longer than the ovary, glabrous, stigma clavate, two-lobed. Fruit ovoid, with a mucro, 7—8 mm high, glabrous, 1-seeded. Seed ovoid, brownish-black to black, smooth, to 6 mm long.

Malay Peninsula, Singápore, Singapore, cultivated in the Botanic Gardens, 2041, Furtado, July 1928 (S).

Java, without precise locality, Blume s.n. (L); Horsfield, Conv. 24 (K); Horsfield s.n. (U); Korthals 125 (L); Waitz 41, 44, 45, 89 (L); Priangan, Warburg 11076 (BD, M); Bandoeng, 1500 m, Smith and Rant 164, Apr. 1911 (B, L, M); Tjinjiroean, above Bandoeng, Docters van Leeuwen s.n., June 1910 (B, L); id., Zeylstra 1, Juli 1908 (B); Tjililin, Reinwardt s.n. (L); near plant. Malabar, 1500 m, Pulle 3162, June 1906 (U); Lembang, Korthals 117 (B, L), 133 (B); Tangkoeban prahoe, Scheffer s.n., June 1871 (B); G. Wajang near Pengalengang, 1800 m, Junghuhn s.n. (L); G. Wajang, Scheffer s.n., May 1871 (B); G. Papandajan, Korthals 134 (L); id., Boerlage s.n., July 1888 (L); id., Went s.n. (L); id., 1500—2000 m, Koens 452, June 1913 (B); id., above Tjikadjang, 1350 m, Thorenaar s.n., June 1931 (B); Garoet or Telaga bodas, Teysmann? 1409 H.B. (B); Telaga bodas, Backer s.n., Jan. 1909 (B); id., Burck 156, June 1891 (B); id., 1300 m, Koens 261, May 1913 (B); Cheribon, G. Tjaremé, above Lingga djati, 800 m, Backer 5007, Oct. 1912 (B); Semarang, Ambarawa, Telomojo, virgin forest, Koorders 27708 β, May 1897 (B, BD, L); id., 1300 m, Koorders 35786 β, May 1899 (B); G. Oengaran, N.-slope, 900—1200 m, Junghuhn s.n., Apr.-June (L); id., Junghuhn 54 (B, L); id., Docters van Leeuwen s.n., Sept. 1910 (B); Kedoe, N.E. Soembing, c. 1700 m, Lörzing 251, March 1912 (B); Soerakarta, Tawangmangoe, 1300 m, Brinkman 801, July 1936 (B); Madioen-Soerakarta, Lawoe, Junghuhn 189, June (L); Ponorogo, Ngebel, G. Wilis, 700 m, Koorders 23906 β, May 1896 (B); id., Koorders 23997 β, May 1896 (B);

id., KOORDERS 29468 β, Aug. 1897 (B, L); id., KOORDERS 29475 β, Aug. 1897 (B, L); Modjokerto-Pasoeroean-Malang, G. Ardjoeno, 1450 m, BREMEKAMP s.n., July 1917 (B); Pasoeroean, G. Ardjoeno, above Poenten, 1250 m, ULTÉE s.n., June 1928 (B); Nangkadjadjar, 1200 m, WISSE 528, May 1921 (B); id., WISSE 552, June 1921 (B); Lawang, BUYSMAN 13 (B); Malang, Poedjon, 1200 m, ULTÉE 172, July 1930 (B); Tengger, 1200 m, BUYSMAN s.n., May 1908 (U); id., WENT s.n. (L); id., Tosari, ZOLLINGER 2560, Nov. 1844 (B, *type number of Porana elegans* ZOLL.); id., KOBUS s.n., June 1900 (B, L); id., common along roads and in maize fields, KOBUS and LOTSY s.n., June-July 1900 (B); between Ngadisari and Tosari, WENT s.n. (L); Bondowoso or Djember, Idjen, c. 1700 m, CLASON-LAARMAN D 90, May 1931 (B); G. Blaoe, VAN DER PIJL 145, June 1929 (B); between Sempol and Djampit, 1200—1400 m, BACKER 25142, June 1918 (B); G. Idjen, W.-slope, frequent, BACKER 25367, June 1918 (B); Gendingan waloeh, c. 1450 m, KOORDERS 43186 β, July 1916 (B, K, L); Bondowoso, Pantjoer-Idjen, distr. Pradjekan, 1700 m, KOORDERS 22250 β, Nov. 1893 (B); id., KOORDERS 28702 β, Aug. 1897 (B); id., KOORDERS 28705 β, Aug. 1897 (B, L); id., 1500 m, KOORDERS 32263 β, Dec. 1898 (B); id., c. 1450 m, KOORDERS 42502 β, July 1916 (B, L); G. Idjen, N.-slope, 1000—1500 m, BACKER 24901, June 1918 (B); Redjengan, c. 1000 m, DAMMERMAN 14, June 1924 (B); G. Baloeran, W.-slope, 500 m, BACKER 24779, June 1918 (B); G. Hijang above Baderan, c. 1800 m, BACKER 13386, Apr. 1914 (B, BD, K, L); N.W. Raoeng, 1500 m, CLASON-LAARMAN 142, May 1932 (B); Djember, S. Idjen, c. 1800 m, KOORDERS 19869 β, Nov. 1893 (B); way to Kawah Idjen, KLEINHOONTE 199, June 1932 (B).

BALI, S. Bali, Kintamani, 1400 m, DE VOOGD 2502 (on a sheet with *Hewittia sublobata* (L.f.) O. K.), May 1936 (B).

SOEMBAWA, Wawa, 400 m, common, Mrs. RENSCH 935, June 1927 (B).

TIMOR, without precise locality, FORBES 4104 (B, L, P); S. Middle Timor, Kaslioe, N. of Moetis, c. 1350 m, WALSH 319, May 1929 (B).

CELEBES, S.W. Celebes, Lambasang, c. 1000 m, BÜNNEMEYER 11730, May 1921 (B, L).

Distribution: Subtropical Himalaya from Garhwal eastwards to Bhotan, up to 6000 ft., and from the Khasia hills to Burma (according to DUTHIE, 1911), S. China, Indo-China, Malay Archipelago.

Vernacular names: snow-creeper (Mal. Peninsula, CLARKE, DUTHIE), tjoenglar, tjloenga, tjoenlar, tjoenlor, tjoenloe (Jav., JUNGHUHN, KOORDERS), rendeng (Jav., JUNGHUHN), srintil (Ponorogo, KOORDERS), ki oke (Madur., KOORDERS).

3. **Porana paniculata** ROXB., Pl. Coast Corom. III (1819) p. 31, t. 235; id., Fl. Ind. II (1824) p. 39; WALL., Cat. (1828) n. 1325; ROXB., Fl. Ind. I (1832) p. 464; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 489; id. in DC., Prodr. IX (1845) p. 436; MIQ., Fl. Ned. Ind. II (1857) p. 626; KURZ in Journ. Bot., New Ser. II (1873) p. 137; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 222; HALL. f. in Versl. 's Lands Plantent. 1895 (1896) p. 125; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 508; COOKE, Fl. Bombay II (1905) p. 227; DUTHIE, Fl. Upper Ganget.

Pl. II (1911) p. 102; KOORDERS, Exk. fl. Java III (1912) p. 114; GAMBLE, Fl. Pres. Madras V (1923) p. 921; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 513 — *Dinetus paniculatus* (ROXB.) SWEET, Hort. Brit. ed. 1 (1827) p. 289 (not seen).

This third species, a native of the northern parts of British India, is cultivated in gardens and occasionally escapes.

It is a large, woody twiner with greyish tomentellous, almost downy stems. The leaves are ovate, cordate at the base, obtuse, acute, acuminate or short-cuspidate at the apex, hairy on both surfaces, distinctly palmately nerved with 5—7 nerves from the base, nerves prominent beneath, veins reticulate. Inflorescences lateral or terminal, paniculate, the flowers smaller than in the preceding species, very numerous, white. Calyx only 1—1.5 mm long, the sepals linear, densely tomentellous; three of the sepals much enlarged in fruit; bracteoles 2, small, subulate, at the base of the calyx. Corolla tubular to funnel-shaped, 5—6 mm long, the limb superficially lobed to crenate. Stamens inserted near the corolla base, very short, included in the tube, all of about the same length, the filaments about as long as the anthers or a little shorter. Ovary globose, glabrous; style 1, very short, shorter than the ovary, stigma globose, lobed.

I could examine the following cultivated specimens:

MALAY PENINSULA, Singapore, Singapore, Botanic Gardens, RIDLEY s.n., Jan. 1905 (S).

JAVA, Batavia, Weltevreden, VAN WELSEM (B); Buitenzorg, Buitenzorg, Botanic Gardens X. F. 38a (L, M); Buitenzorg, private garden, BAKHUIZEN VAN DEN BRINK fil. 395, June 1920 (B); foot of G. Salak, garden, BACKER 22004, Jan. 1917 (B); Priangan, Bandoeng, EYKEN, Sept. 1912 (B); Kedoe, Magelang, VAN OOSTEN 11 (B); Djember, Djember, ULTÉE 13 (B).

Distribution: Northern India, westward to the Punjab and Mount Abu and eastwards to Bengal and Upper Burma and on the Himalaya in Kumaon up to 4.000 ft (DUTHIE, 1911); cultivated in the Malay Peninsula and Archipelago, also in other tropical countries.

Vernacular name: bridal creeper.

Use: Cultivated in gardens for its dense masses of white flowers; the panicles of flowers are used in some parts of British India for table decoration (COOKE); the stems are much used in the Saharanpur district in making baskets for rough work (DUTHIE).

TWO NEW LECYTHIDACEAE AND TWO NEW APOCYNACEAE FROM MALAYSIA

by

W. J. LÜTJEHARMS and S. J. VAN OOSTSTROOM

(Leiden).

(Issued May 2nd, 1938).

During the year 1936 the first of us made a trip to the island of Enggano (W. coast of Sumatra, Residency of Benkoelen) for the special purpose of collecting Cryptogams. During this trip also a number of Phanerogams could be gathered. The collections made are preserved at the Rijksherbarium at Leiden, duplicates are to be found in the Herbarium at Buitenzorg. The Phanerogams were preliminary identified by Dr. D. F. VAN SLOOTEN (*Leguminosae, Flacourtiaceae, Combretaceae, Gramineae*) and by Dr. C. G. G. J. VAN STEENIS [1]). Afterwards some additional determinations were made by several specialists (BREMEKAMP, HENRARD, JONKER, Miss KOSTER, LAM, J. J. SMITH, UITTIEN) and by the authors. It resulted that a few species proved to be hitherto undescribed. Two of them will be published below, together with two others met with in the collections of the Rijksherbarium during our investigations. Some others will be published elsewhere in this periodical.

LECYTHIDACEAE

Barringtonia flagellata LÜTJEH. et VAN OOSTSTR., n. sp. — fig. 1, a—g. Arbor parva, circ. 5 m alta; ramulis pallide cinereis, teretibus, juvenilibus in sicco longitudinaliter corrugatis; foliis ad ramulorum apices aggregatis, glaberrimis, anguste oblongo-ellipticis vel oblongis, apice breviter acuminatis, basi breviter suboblique cuneatis, breviter angusteque decurrentibus, (22—)31—35 cm longis, (6—)10—12.5 cm latis, chartaceis, in sicco utrinque pallide viridibus, costa supra anguste subacute

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[1]) To Dr. D. F. VAN SLOOTEN and especially to Dr. C. G. G. J. VAN STEENIS (Buitenzorg) may be expressed my sincere thanks for their invaluable help in identifying my collections. W. J. LÜTJEHARMS.

prominula, subtus valde prominente, nervis lateralibus utrinque 14—16, fere ad marginem ascendentibus, arcuatim plusminusve confluentibus, supra prominulis, subtus prominentibus, nervulis rete gracile supra parum, subtus valde prominulum efficientibus; margine obsolete ser-

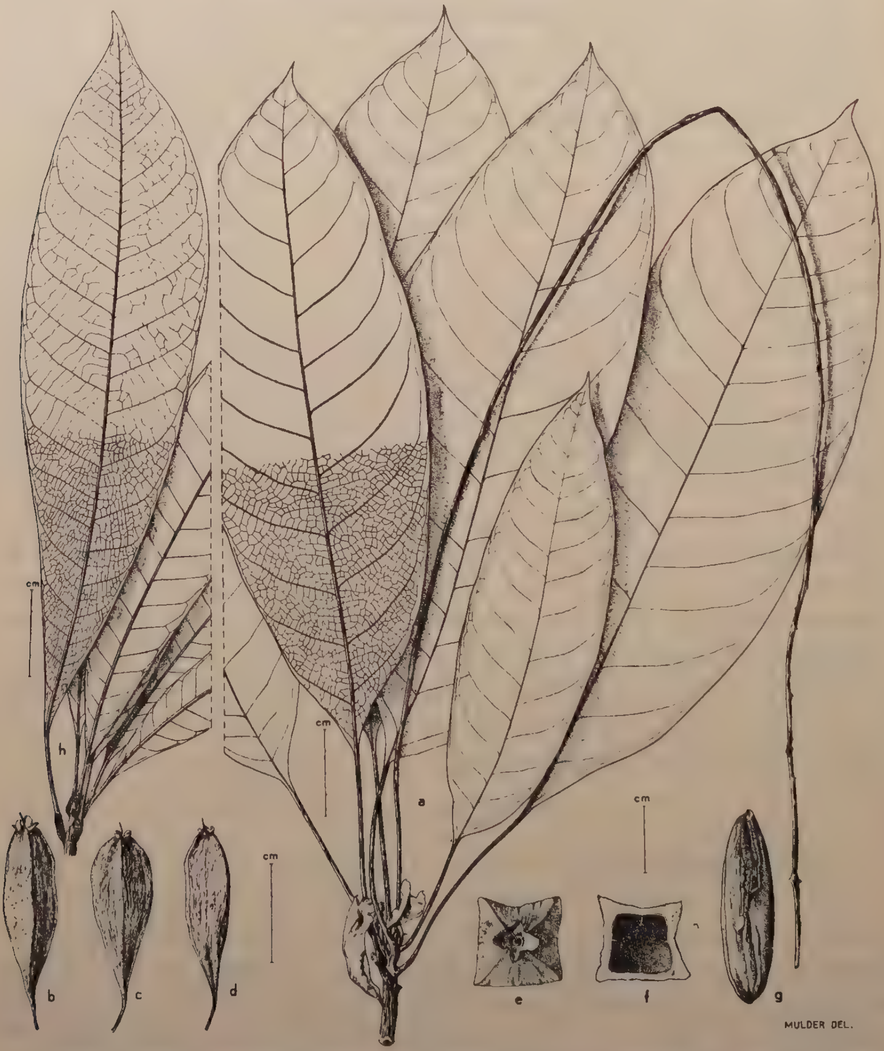

Fig. 1, *a—g*: *Barringtonia flagellata* Lütjeh. et van Ooststr., (Lütjeharms n. 4189, *type*); *a*, top of a branch with leaves and rhachis of an infructescence, destitute of fruits; *b—d*, fruits; *e*, fruit from above; *f*, cross section of fruit; *g*, seed; *h*: *Barringtonia confusa* Lütjeh. et van Ooststr., (Zippelius n. 53/d, *type*), top of a branch.

rulata, angustissime revoluta; petiolo gracili, (6—)9.5—11 cm longo, in sicco striatulo, pallide olivaceo, basi incrassato, atrobrunneo; alabastris et floribus ignotis; infructescentiis terminalibus, longissime racemiformibus, solitariis, circ. 85 cm longis, rhachi gracili, circ. 2 mm crassa, in sicco longitudinaliter striata, cicatrices florum irregulariter, nunc sparse, nunc conferte dispositas gerente, basi bracteis nonnullis ovato-lanceolatis margine minute ciliatis, 6—7 mm longis instructa; fructubus pedicellatis, pedicello 1—1.5 cm longo, acute quadrangularibus, anguste obpyriformibus, circ. 5 cm longis, 1.7—2 cm diametro, reliquiis calycis stylique coronatis, unilocularibus; semine unico, anguste elongato-ellipsoideo vel oblanceolato-ellipsoideo, circ. 3 cm longo, circ. 1.2 cm crasso; sepalis 4, in fructu ovato-oblongis, late triangularibus vel semiorbicularibus, 3—4 mm longis, glabris.

TYPE: Malay Archipelago, Enggano (Res. of Benkoelen, Sumatra), forest near Boea-Boea, ± 100 m alt., June 3, 1936, leg. W. J. LÜTJEHARMS n. 4189 (type in Herb. Lugd. Bat.).

VERNACULAR NAME: poetat (Malayan, Palembang).

OBS. 1. According to the fieldnotes the fruits of this new species are of a reddish colour.

OBS. 2. Somewhat below the leaves at the apex of the only twig of the type collection there is a sessile leafy bud scale of a narrow spathulate form, rounded at the apex and measuring ca. 5 × 2 cm. At the apex of the twig below the bracts surrounding the base of the peduncle there are two or three small, petioled leaves of about 1½—2 cm length.

OBS. 3. This interesting new species must be considered as to belong to the subgenus *Stravadium* (JUSS.) MEISSN. On account of the mature fruit showing the rests of four dissipiments it probably belongs to the section *Doxomma* (MIERS) NIEDENZ. It is at once characterized by its long and slenderly curved inflorescence, its long and slender petioles, the obscurely serrulate and narrowly revolute margin of the leaf-blades and the sharply quadrangular, narrow-obpyriform, pedicellate fruit.

OBS. 4. Some of the apparently closely related species are *B. Eberhardtii* GAGNEP., *B. longipes* GAGNEP., *B. cochinchinensis* (BL.) MERR., *B. kratensis* CRAIB. With *B. Eberhardtii* it has the long slender inflorescence in common, it differs, however, by the larger leaves, with obscurely serrate leaf-margin, in having 14—16 (instead of 5—7) pairs of nerves and by the petiole being much longer. From *B. longipes* it differs by the slightly larger leaves and longer petioles, and by the form of the fruit, which has the same length but is about half as broad and is

distinctly and sharply quadrangular, while in *B. longipes* it is obscurely angular or almost smooth (according to GAGNEPAIN). *B. cochinchinensis* and *kratensis* have the leaves smaller and more or less distinctly serrate. Moreover, *B. cochinchinensis* has the petiole relatively longer and the fruit oblong-cylindrical, more or less acute at *both* ends. The fruit of *B. kratensis* seems to be unknown. The fruit of our new species shows a superficial resemblance to that of *B. acutangula* (L.) GAERTN., but the leaves in the latter species are entirely different.

OBS. 5. The branch we possess of our new species shows a certain resemblance to two specimens preserved in the Rijksherbarium at Leiden, collected by ZIPPELIUS in Amboina (ZIPPELIUS 53/d), identified by BLUME as *Barringtonia rubra* BL. Comparing the Enggano plant with that of Amboina, it is, however, obvious that there are several distinctive characters. The Enggano plant has the leaves narrow oblong-elliptic or oblong (the broadest part in the middle), the apex shortly acuminate, the base shortly cuneate and somewhat oblique with a petiole of (6—)9.5—11 cm being the $^1/_3$—$^1/_4$ part of the length of the blade. The number of lateral nerves amounts to 14—16. The plant from Amboina has the leaves oblanceolate-oblong, the broadest part above the middle, the apex shortly acuminate, the base distinctly cuneate, not distinctly oblique, whereas the petiole has a length of 2.5—5 cm, being $^1/_7$—$^1/_9$ part of the length of the blade. The number of lateral nerves amounts to 17—19. Moreover the rhachis of the inflorescence in the Enggano specimen is much longer, though this needs not to be of any importance as the Enggano plant is in fruiting stage, whereas one of the specimens from Amboina has only young flowers. These flowers show an undivided calyx; the calyx on the fruits in the Enggano specimen is distinctly 4-fid.

Studying the plant of ZIPPELIUS there arose some difficulties, which might be of interest from a nomenclatorial point of view. These difficulties have reference to the name *Barringtonia rubra* added by BLUME to the plants of ZIPPELIUS, but their real origin is much older and can be carried back to the conception of *Eugenia acutangula* by LINNAEUS.

The species *Eugenia acutangula* as it has been established by LINNAEUS in the first edition of his Species Plantarum must be regarded as a mixture of two units, viz.:

1. A Ceylon species, according to MIERS [1]) represented in the Hermann Herbarium at the British Museum, London, which has to bear the name *Barringtonia acutangula* (L.) GAERTN.

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[1]) MIERS in Transact. Linn. Soc., 2nd series, Botany, I, 1875, p. 80.

2. The plant described and figured by RHEEDE in his Hortus Malabaricus, Vol. IV, 1673, p. 15, tab. 7, to which plant MIERS gives the name *Butonica rubra* ¹), based on *Stravadia rubra* PERSOON ²), the latter species with the exception of the synonym of RUMPHIUS. If we consider this species as to belong to the genus *Barringtonia*, the correct name must be *Baringtonia rubra* (PERS.) BLUME, for BLUME created this combination in VAN HOUTTE, Flore des Serres, VII, 1851, p. 23. It must be emphazised that in making the new combination BLUME had in mind a plant from the Moluccas (see below) and not from British India. Unfortunately this Moluccan plant is another one as that of RHEEDE, so that BLUME's new combination must be considered as valid for the name only, excluding the description.

In the second edition of his Species Plantarum LINNAEUS added to the synonyms given already in the first edition the name Butonica terrestris rubra used by RUMPHIUS in his Herbarium Amboinense, III, 1743, p. 181, tab. 115. This plant, however, represents a third species different from the two others mentioned above in various characters. MIERS in his memoir "On the Barringtoniaceae" ³) based his species *Butonica terrestris* MIERS (not RUMPH. as mentioned by MIERS) on two specimens collected by HORSFIELD from Banca and from Patjetan (East Java) and on the description and plate of RUMPHIUS. He makes the supposition that indeed the plants of HORSFIELD represent the same species as RUMPHIUS's Butonica terrestris rubra. There is, however, no certainty at all about this, as the specimens of HORSFIELD and the description of MIERS do not fit very well for RUMPHIUS's plant. It seems better to leave the identity of the species figured by RUMPHIUS undecided for this moment.

Now there are, as stated above, in the Rijksherbarium at Leiden two sheets of *Barringtonia*, both from Amboina, collected by ZIPPELIUS, and bearing the name *Barringtonia rubra* BL. in BLUME's handwriting. These specimens fairly well correspond with the description given by BLUME in VAN HOUTTE, Fl. des Serres, l.c. under *Barringtonia rubra* BL. As has been already pointed out, the specific epitheton *rubra* cannot be used for these plants as it is connected with the species figured by RHEEDE. Now there are three possibilities:

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¹) MIERS, l.c. p. 70.

²) PERSOON, Synopsis Plantarum II, 1807, p. 30.

³) MIERS l.c.

1. The specimens of Amboina collected by ZIPPELIUS represent the same species as RUMPHIUS's plate;

2. they belong to *Butonica terrestris* MIERS; this species based on the specimens of HORSFIELD only;

3. they represent a species different both from that of RUMPHIUS and from *Butonica terrestris* MIERS. In the latter case we must regard the Amboina specimens of ZIPPELIUS as representatives of a new species.

Comparing the specimens of ZIPPELIUS with MIERS's description of *Butonica terrestris* and with the HORSFIELD specimens, we can state that the differences are so important that they can impossibly belong to the same species. So the second possibility is already excluded. Do the specimens of ZIPPELIUS possibly belong to RUMPHIUS's species? This question must stay unsolved, as nobody knows exactly what is the species of RUMPHIUS. Anyhow the specimens of ZIPPELIUS, being identic or not with RUMPHIUS's species, have to bear a valid name, as the name *Barringtonia rubra* given to them by BLUME is related to Tsjeria Samstravadi of RHEEDE, as stated above. We therefore propose the name *Barringtonia confusa.*

One could put forward that *Barringtonia confusa* is the same species as RUMPHIUS's *Butonica terrestris alba* (= *Butonica silvestris alba*) (Herb. Amboin. III, 1743, p. 181, tab. 116), the base of *Stravadia alba* PERS. = *Stravadium album* (PERS.) DC. = *Barringtonia alba* (PERS.) BL. Here again must be stated that nobody knows RUMPHIUS's species, and that it is impossible to prove the identity of both.

MERRILL, in his paper entitled "An interpretation of RUMPHIUS's Herbarium Amboinense", 1917, supposes the identity of RUMPHIUS's *Butonica terrestris rubra* and *Butonica terrestris alba* with *Barringtonia racemosa* (L.) BL. As a representative of *Butonica terrestris alba* the Bureau of Science, Manila, distributed specimens collected by ROBINSON (no. 467), which doubtless belong to *Barringtonia racemosa* (L.) BL. The latter species rather well agrees with RUMPHIUS's not too clear description of *Butonica terrestris alba,* but not so well with his plate, which shows distinctly petiolate leaves with slender petioles, whereas the leaves of *B. racemosa* (L.) BL. are very shortly and broadly petiolate or almost sessile, so that in our opinion the identity must be doubted.

Barringtonia confusa LÜTJEH. et VAN OOSTSTR., n. sp. — fig. 1, h.

B. rubra BL. in VAN HOUTTE, Fl. des Serres, VII (1851) p. 23, quoad descript.

Arbor?, ramulis in sicco cinereo-brunneis, teretibus, in sicco longitudinaliter obscure corrugatis, glaberrimis; foliis ad ramulorum

apices aggregatis, glaberrimis, oblanceolato-oblongis, apice acuminatis, basi valde cuneatis anguste decurrentibus, (23.5—)26—33(—37) cm longis, (5.5—)6.5—8.5(—10) cm latis, chartaceis, in sicco cinereo-viridibus, supra opacis, subtus nitidulis, costa supra prominula, subtus prominente, nervis lateralibus utrinque 17—19, patentibus, ad marginem ascendentibus, haud confluentibus sed prope marginem nervulis transversalibus connectis, supra prominulis subtus prominentibus, nervulis supra et subtus rete gracile prominulum efficientibus, margine obsolete, prope basin obsoletius crenulatis, non vel angustissime revoluta; petiolo gracili, 2.5—5 cm longo, supra subapplanato, in sicco striatulo, cinereo-viridi, basi valde incrassato, in sicco ruguloso, brunneo-rufescente; inflorescentiis in axillis foliorum superiorum positis, solitariis, racemiformibus, juvenilibus circ. 23 cm longis, circ. 70-floribus, rhachi gracili, circ. 1.5 mm crassa, tereti, farinosa; floribus valde immaturis (alabastris globulosis circ. 3 mm diam.) pedicellatis, in axillis bractearum minutarum lanceolatarum, circ. 0.5 mm longarum positis, pedicello 2.5—3 mm longo, plusminusve farinoso, basi articulato, in alabastro receptaculo obconico, 2 mm alto, subfarinoso, calyce globoso cupulato, integro, circ. 3 mm alto, subfarinoso vel glabro, petalis 3, orbicularibus, valde concavis, filamentis numerosis, ovario 3-loculari.

TYPE: Malay Archipelago, Amboina, leg. ZIPPELIUS n. 53/d (type in Herb. Lugd. Bat.; a specimen with very young flowers and a sterile specimen).

OBS. 1. See the remarks under obs. 5 belonging to *Barringtonia flagellata,* p. 94.

OBS. 2. On account of the calyx being cup-shaped and entire in bud, the new species seems to belong to the subgenus *Butonica* (JUSS.) NIEDENZ. It is among others characterized by the slenderly petioled leaves. It is a curious fact that the majority of the species possessing such slender petioles seems to belong to the subgenus *Stravadium* (JUSS.) NIEDENZ.

OBS. 3. The flowers of the type specimen are in a very young stage. They permitted, however, to get an impression of the form of the entire calyx, the number of the petals and of the cells of the ovary. The form of the petals we described as to be orbicular, it is possible, however, that this form will change afterwards. The number of petals and cells of the ovary being 3 is very remarkable, but in several flowerbuds we dissected this number was constantly found. As we have only one specimen at hand, it is impossible to decide if the 3-merous corolla and ovary represent a constant feature or merely a slight anomaly.

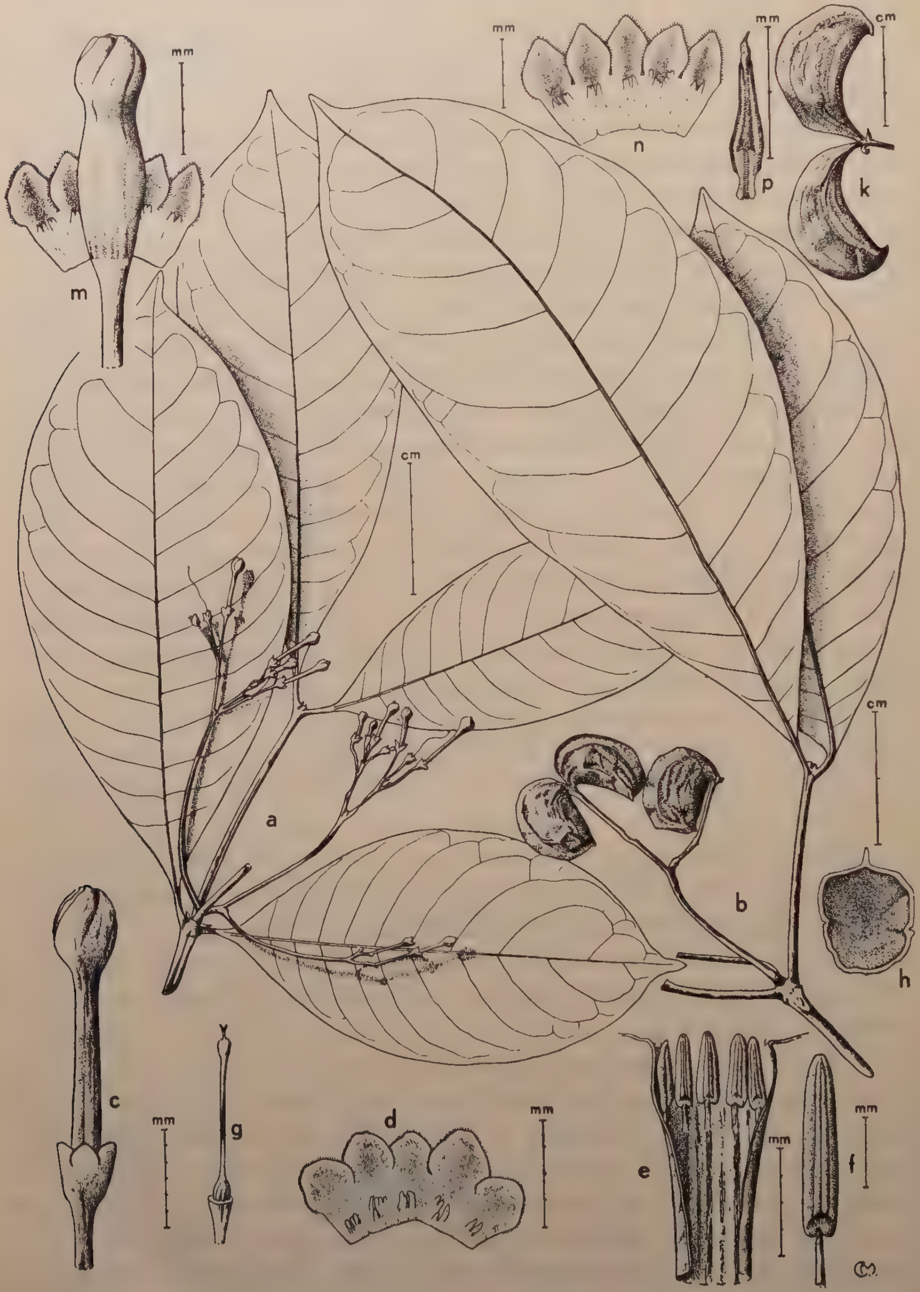


Fig. 2, *a—h*: *Tabernaemontana carinata* LÜTJEH. et VAN OOSTSTR., (LÖRZING n. 6994, *type*); *a*, flowering branch; *b*, fruiting branch; *c*, flowerbud; *d*, calyx, opened; *e*, upper part of corolla tube; *f*, stamen; *g*, pistil; *h*, cross section of fruit; *k—p*: *Tabernaemontana inaequalifolia* LÜTJEH. et VAN OOSTSTR., (LÜTJEHARMS n. 4461, *type*); *k*, fruit; *m*, flowerbud with opened calyx; *n*, calyx, opened; *p*, young stamen.

APOCYNACEAE

Tabernaemontana inaequalifolia LÜTJEH. et VAN OOSTSTR., n. sp. — fig. 2, k—p.

Arbor, circ. 8—10 m alta, ramulis glabris, pallide griseo-viridibus, adultis teretibus, juvenilibus subangulatis vel compressis, 3—5 × 2—3.5 mm diam., foliis chartaceis, in paribus distincte inaequalibus, glabris, utrinque opacis, subtus pallidioribus, majoribus singulae paris ellipticis vel oblongo-ellipticis, apice breviter acute acuminatis, basi subobliquis, acutis plusminusve angusteque decurrentibus, 16—30 cm longis, 6.5—13 cm latis; minoribus singulae paris late ellipticis vel ellipticis vel interdum oblongo-ellipticis, apice in foliis latioribus plusminusve abrupte acuminatis, in angustioribus acuminatis basi rotundatis breviter abrupteque decurrentibus, 7—25 cm longis, 4.5—10.5 cm latis; costa supra impressa, subtus prominente, nervis primariis supra prominulis, subtus prominentibus, in foliis majoribus singulae paris (10—)11—13(—15), in foliis minoribus (5—)8—11; petiolo supra canaliculato, apice anguste alato, in foliis majoribus singulae paris 15—28 mm, in foliis minoribus (9—)11—17(—23) mm longo; stipula singula intrapetiolari triangulari excavata, circ. 3 mm longa, stipulae foliorum binorum oppositorum lineis prominulis interpetiolaribus connatae; inflorescentiis supraaxillaribus, supra pseudodichotomiam ramulorum decussate positis, lobis calycis ciliatis exceptis glabris, pedunculatis, cymosis, pedunculo 3—5.5 cm longo, ramis primariis circ. 10—12 mm longis, pedicellis apice incrassatis, (7—)10—12(—16) mm longis; calyce campanulato, in floribus immaturis circ. 5 mm alto, 5-partito, lobis margine ciliolatis, circ. 2.5 mm longis, exterioribus 2 triangularibus intus ad basin glandulis circ. 2—3, minutis, ligulatis instructis, interioribus 3 paulo latioribus, ovatis vel late ovatis, margine membranaceis, intus ad basin glandulis circ. 3—6, ut supra instructis; corollae tubo (in floribus valde immaturis) glabro, lobis extus glabris, staminibus 5, filamentis prob. brevibus, supra medium tubi corollae insertis, antheris prob. breviter sagittatis, apiculatis, stigmate exannulato; folliculis binis, interdum singulis, in vivo aurantiacis, patentibus, falcato-elongatis, plusminusve allantoideis, subcarnosis, basin versus attenuatis, sessilibus, mucronulatis, obsolete 3-lineatis, circ. 2.5—4.5 cm longis, 1.5—2.2 cm latis; seminibus, usque ad 11 (in folliculis minoribus interdum 2), rubro-arillatis, curvato-oblongis vel reniformibus, ad hilum valde sulcatis, circ. 11—15 mm longis, 5—7 mm latis, testa crustacea, longitudinaliter sulcata, minute papillata, albumine ruminato.

TYPE: Malay Archipelago, Enggano (Res. of Benkoelen, Sumatra), forest near Boea-Boea, ± 100 m alt., June 9, 1936, leg. W. J. LÜTJEHARMS n. 4461 (type in Herb. Lugd. Bat.).

VERNACULAR NAMES: bentaoes (Malayan, Palembang), ekaniohkoë (Engganese).

OBS. 1. According to the field notes a tree of about 8—10 m height with a trunk of 13 cm in diam. at 1.5 m above the ground. The fruits are orange-red with an unpleasant smell; the aril is red and according to a native tree collector the flowers should be white. Latex white. In contradistinction to the surrounding trees, this one was fully bare of epiphytes.

OBS. 2. We arrange this species and the following one under *Tabernaemontana*, referring to the remarks on that genus given by MERRILL in his paper published in the Contributions from the Arnold Arboretum, VIII, 1934, p. 143, with which remarks we fully agree.

OBS. 3. Although the inequality of the leaves of one leafpair in this species is a character occurring in many other representatives of the genus, it is so obvious here, that we did not hesitate to derive the specific epitheton from this character.

Tabernaemontana carinata LÜTJEH. et VAN OOSTSTR., n. sp. — fig. 2, a—h.

Arbor? Frutex? Ramulis glabris, angulatis vel subcompressis, 2.5—4 mm diametro; foliis chartaceis, in paribus distincte inaequalibus, glabris, utrinque opacis, subtus pallidioribus, ellipticis vel oblongo-ellipticis, apice plusminusve abrupte breviter obtusiuscule acuminatis, basi decurrento-cuneatis, acutis, 13—25 cm longis, 6—11 cm latis, nervis primariis utrinque 10—12, supra subimpressis vel leviter prominentibus, costa nervisque primariis subtus distincte prominentibus; petiolo 8—12 mm longo, supra plano vel subcanaliculato, angustissime alato, basi stipula singula intrapetiolari triangulari excavata circ. 3 mm longa praedita, stipulis foliorum binorum oppositorum lineis prominulis interpetiolaribus connatis; inflorescentiis supraaxillaribus, supra pseudodichotomiam ramulorum decussate positis, pedunculatis, cymosis, pedunculo glabro, 5—6 cm longo, ramis primariis glabris, 1—1.5 cm longis, pedicellis glabris usque ad 13 mm longis; calyce 5-partito, lobis suborbicularibus apice rotundatis, extus puberulentis, margine ciliolatis, circ. 2 mm longis, intus ad basin glandulis 3—4, minutis, anguste ligulatis instructis; corollae tubo (in floribus fere maturis) circ. 14 mm longo, 1.5—2 mm diam., glabro, apice subdilatato, lobis in alabastro globulam formantibus, probabiliter suborbicularibus, extus puberulentis; staminibus 5, filamentis brevibus supra medio in dilatatione tubi corollae insertis, antheris anguste oblongis, brevissime obtuseque sagittatis, 2.5 mm longis; stigmate exannulato, cylindrico, apiculo elongato breviter bifido praedito; folliculis binis vel interdum singulis, sessilibus, recurvis, falcatis, fere semiorbicularibus, 2.5—2.8 cm longis, 1.5—2 cm latis, dorso alato-carinatis, lateraliter utrinque carina obsoleta praeditis; seminibus circ. 4, arillatis, subcurvatis, lateraliter subcompressis, ad hilum valde sulcatis, circ. 13 mm longis, 6—8 mm latis, testa crustacea longitudinaliter sulcata, minute papillata, albumine leviter ruminato.

TYPE: Malay Archipelago, Berhala-island (East Coast of Sumatra), ± 80 m alt., November 2, 1919, leg. J. A. LÖRZING n. 6994, with almost expanded flowers and mature fruits (type in Herb. Lugd. Bat.).

Obs. 1. Concerning the conception of this species as a *Tabernaemontana* we may refer to Obs. 2 under the preceding species, *T. inaequalifolia.*

Obs. 2. We met with this species during our investigation of *Tabernaemontana inaequalifolia,* with which species it shows a superficial resemblance. It is at once distinguished, however, by the quite different fruit. It was originally distributed by the Herbarium at Buitenzorg under the name of *T. sphaerocarpa* BL. In contradistinction with *T. carinata* which has the follicles mostly in pairs, falcate or semiorbicular, distinctly carinate at the back, those of *T. sphaerocarpa* are mostly solitary, more or less globular and much larger.

A NEW SPECIES OF IXORA FROM ENGGANO (SUMATRA)

by

C. E. B. BREMEKAMP

(Bilthoven).

(Issued May 2nd, 1938).

Ixora engganensis Brem., n. spec. ad sectionem *Otobactrum* et ad seriem *Longitubarum* pertinens, *I. paludosae* valde affinis, sed foliis acuminatis, basi obtusis, inflorescentia laxiore, corollae lobis longioribus et stylo longius exserto ab ea distinguenda.

Arbuscula. Rami veteriores cortice griseo-brunneo opaco, haud distincte fisso vestiti. Folia ordinaria petiolo 8—12 mm longo munita; lamina oblonga 9.5—16 cm longa et 3.5—6 cm lata, apice acuminata et mucronata, basi obtusa, herbacea, utrimque subopaca, costa basin versus impressa, nervis utroque latere costae 8—10 tenuioribus, venulis tenuissimis. Stipulae triangulares in aristam vagina longiorem exeuntes, axilla pilosae. Folia suprema brevius petiolata an subsessilia, ovato-oblonga, basi rotundata an subcordata. Inflorescentia laxe corymbosa, puberula, e floribus circ. 75 composita. Pedunculus 9—12 cm longus, puberulus, internodio usque ad 2.5 cm longo foliis brevissime petiolatis, oblongis, usque ad 3 cm longis et 1 cm latis munito praecessus. Ramuli infimi 2.2—4.4 cm longi. Flores laterales triadum pedicellis 3 mm longis instructi; flores centrales sessiles. Bracteae angustissime triangulares; infimae 2 mm longae; aliae peripheriam versus gradatim breviores. Bracteolae 0.5 mm longae. Ovarium glabrum. Calyx tubo subnullo, lobis late triangularibus 0.5 mm longis. Corolla alba tubo 2.3 cm longo, extus intusque glabro, lobis lineari-oblongis 8.5 mm longis et 2 mm latis, utrimque glabris, acutis, reflexis, margine revolutis. Filamenta 2 mm; antherae 4 mm longae, acutissime exeuntes. Styli pars exserta stigmatibus 1.2 mm longis comprehensis 5 mm longa.

Type: Malay Archipelago, Enggano (Res. Benkoelen, Sumatra), Meok, in the fringe of the forest, June 20, 1936, leg. W. J. Lütjeharms n. 4863 (type in Herb. Lugd. Bat.).

In the only specimen available the inflorescences at the end of the shoots have disappeared: those present are borne by short shoots springing from the axils of the upper leaves and consisting of a single, very short, internode provided with rudimentary leaves.

In trying to determine this species with my key (Bull. du Jard. Bot. de Buitenzorg, 1937), one would arrive near *I. mirabilis* and *I. karimatica*, two Bornean species, in which, as in *I. engganensis*, the corolla tube is less than three times as long as the lobes: with these two species *I. engganensis* has apart from this character very little in common. It is doubtless related to *I. paludosa*.

A NEW BURMANNIA FROM ENGGANO (SUMATRA)

by

F. P. JONKER

(Botanical Museum and Herbarium of the University, Utrecht).

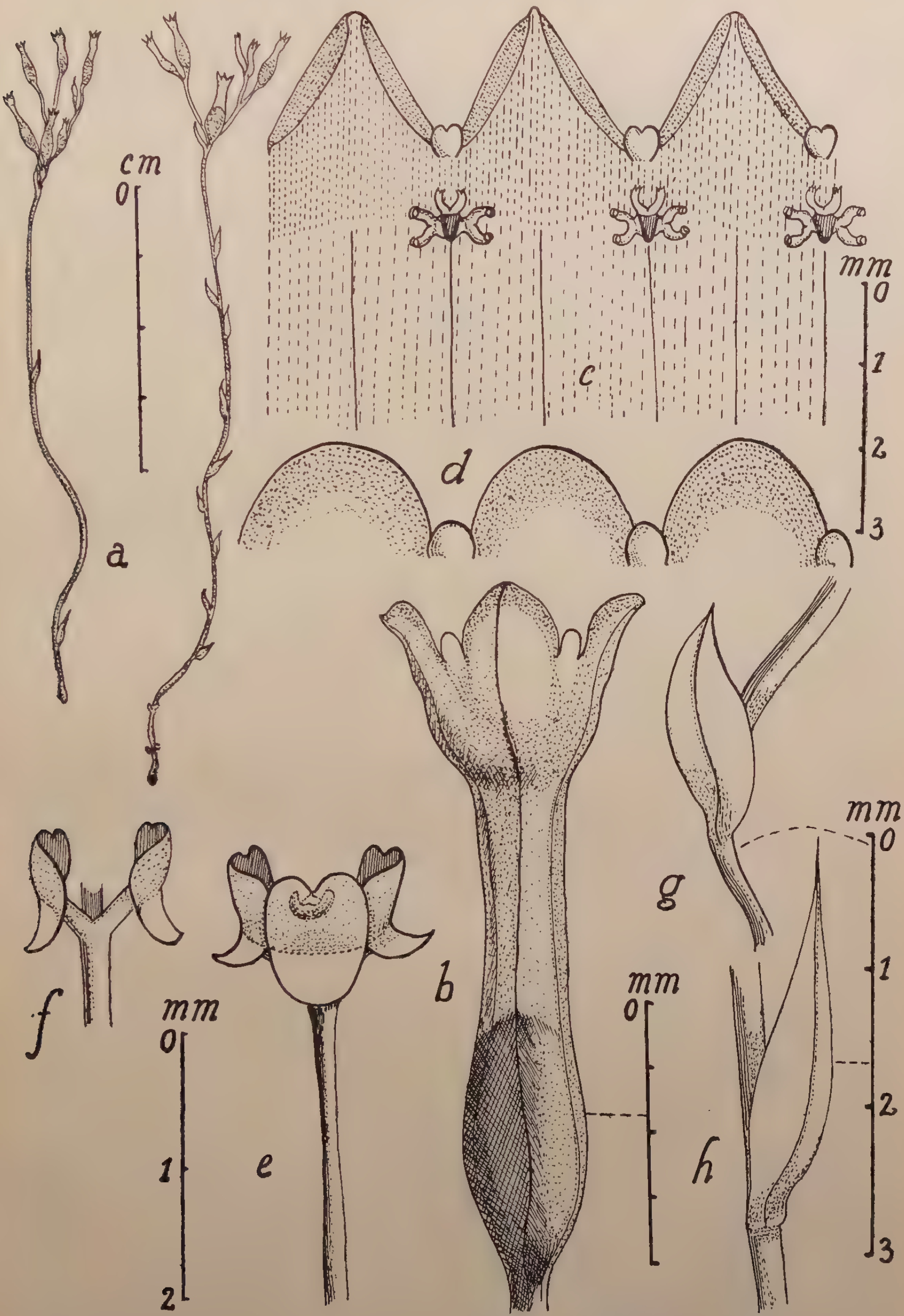
(Issued May 2nd, 1938).

Burmannia engganensis Jonk., n. sp.

Herba pusilla, saprophytica, 10—13 cm alta. Radices ignotae. Caulis simplex, erectus, teres, glaber, succulentus. Folia 3—8, squamas simulantia, lanceolata vel ovato-lanceolata, glabra, acuta vel acuminata, 2—6 mm longa, uninervia, nervo prominente. Folia basalia rosulata nulla. Bracteae plm. 5 mm longae, ovatae, acutae. Flores 5—9, albi-purpurascentes, 9—12 mm longi, erecti, pedicellati, in cincinnos geminos conferti. Limbus succulentus, 6-lobatus, lobis exterioribus tribus, 1.5—2 mm longis, erectis, in alabastris et floribus junioribus margine involutis, triangularibus, obtusis; in floribus perfectis orbiculatis et margine evolutis; lobis interioribus erectis, crassis, glandulosis, ovatis vel obovatis vel orbiculatis, obtusis vel rotundatis vel retusis, quam exteriores brevioribus, 0.25—1 mm longis. Tubus perigonii trigono-cylindricus, 4—5 mm longus, 6-nervius. Alae perianthii subnullae, in costas angustas reductae. Antherae sessiles, lobis interioribus oppositae sed profundius insertae, connectivis triangularibus, apice bicristatis, cristis curvatis. Stylus crassus, trifurcatus, ramis apice stigmate praeditis, appendiculo membranaceo rotundato pendulo. Stylus cum stigmatibus 4—4.5 mm longus. Ovarium obovoideum vel ellipsoideum, 3—4 mm longum, triloculare. Ovula numerosa, ovoidea vel ellipsoidea.

Type: Malay Archipelago, Enggano (Res. Benkoelen, Sumatra), forest near Boea-boea, 100 m alt., fl. June 8, 1936, leg. W. J. Lütjeharms n. 4437. *Cotype*: id., fl. June 14, 1936, leg. W. J. Lütjeharms n. 4736.

This new *Burmannia,* twice collected by Dr Lütjeharms on Enggano island, Res. of Benkoelen, Sumatra, belongs to the saprophytical species of the genus. The stem and scalelike leaves are without chlorophyll, radical rosulate leaves are lacking. Other Malaysian colourless species are *B. gracilis* Ridl., *B. lutescens* Becc., *B. tridentata* Becc. and *B. oblonga* Ridl. with prominently winged flowers; and *B. bi-*



Burmannia engganensis JONK. — *a.* two plants; *b.* flower; *c.* perianth of young flower, opened and showing the stamens; *d.* limb of older flower; *e.* style and stigmas; *f.* upper part of style with style-branches and two stigmas; *g.* and *h.* stem-scales.

faria J. J. S. with *B. tuberosa* Becc. and the closely allied *B. Championii* Thw., three species without wings. To these three species *B. engganensis* is allied; from *B. tuberosa* and *B. Championii* it is easily distinguishable by its inflorescence. Both *B. tuberosa* and *B. Championii* have few, clustered, shortly pedicellate flowers at the top of the stem, whereas the stem of *B. engganensis* is forked at the apex into a bifid cyme, bearing shortly pedicellate, erect flowers. Also the shape of the inner perianth-lobes and the apiculate connective are quite distinct. *B. bifaria* J. J. S. is closely related but differs by its papillose connective and its distichous, imbricate stem-scales. Also the shape of the inflorescence is somewhat deviating.

The wingless flowers and the shape of the inflorescence recall somewhat the genus *Gymnosiphon* Bl.

HAPLOLOBUS CELEBICUS, NOV. SPEC.
(Burseraceae)

by

H. J. LAM

(National Herbarium, Leiden).

(Issued May 2nd, 1938).

Description of type specimen:

Haplolobus celebicus, nov. spec. — Arbor altiuscula; ramuli subgraciles, circiter 0.4—0.7 diam., lenticellati, vetustiores (in sicc.) lenticellis plus minusve rugosi, alabastro terminali minuto pulverulento, ceterea glabri; medulla compacta aresinosa. *Folia* glabra estipulata, (1½—)2½—3½(—4½)-jugata; petioli teretes lenticellati, ima basi supra vix deplanati, basi nodisque rhachidis vix articulati, 6.5—9.5 cm longi, rhachidis partes interjugales 2.8—5.5 cm longae, medulla nonnullis fasciculis resiniferis magnis percursa; foliola chartacea, in sicc. viridiuscula, ovata vel ovato-oblonga ad oblongo-lanceolata, basi plus minusve inaequalia rotundata ad acuta, marginibus integra, apice breviter obtuse subabrupte acuminata, 9—15—21 cm longa, 4—6—8.5 cm lata, petioluli 1.3—2.7, terminales 3.5—6 cm longi, acumen 0.5—1.5 cm longum; nervi secundarii cum costa media subtus in sicc. paulo prominentes, supra paulo sulcati, utrinque (6—)8—11, angulo circiter (50°—)70°—80° de costa adscendentes, praecipue margines folii versus curvati, margine 0.2—0.4 cm distante ea subparalleli, diminuentes, apice folii tantum arcuatim conjuncti; nervi tertiarii pertenues, transversi, sinuosi, pauci, prope costam ea perpendiculares, cum reticulatione laxa in sicc. utrinque conspicui. *Inflorescentiae* (♀ ignotae) ♂ axillares, multiflorae, glabrae, e ima basi late paniculato-ramosae, rami 10—22 cm longi, penultimi cymosi, cymulae ultimae 3-florae, interdum ramulorum apicibus alabastro vegetativo suffultis ¹); bracteae perminutae deltoideae. *Flores* (♀ ignoti) ♂ glabri, minuti, alabastris globosis, 0.1—0.15 cm diam., pedicelli pergraciles 0.05—0.15 cm longi, apicum versus dilatati, ebracteolati. Calyx 3-fidus, circ. 0.1 cm altus, sepala brevia late deltoidea. *Petala* 3 oblongo-ovoidea, 0.15—

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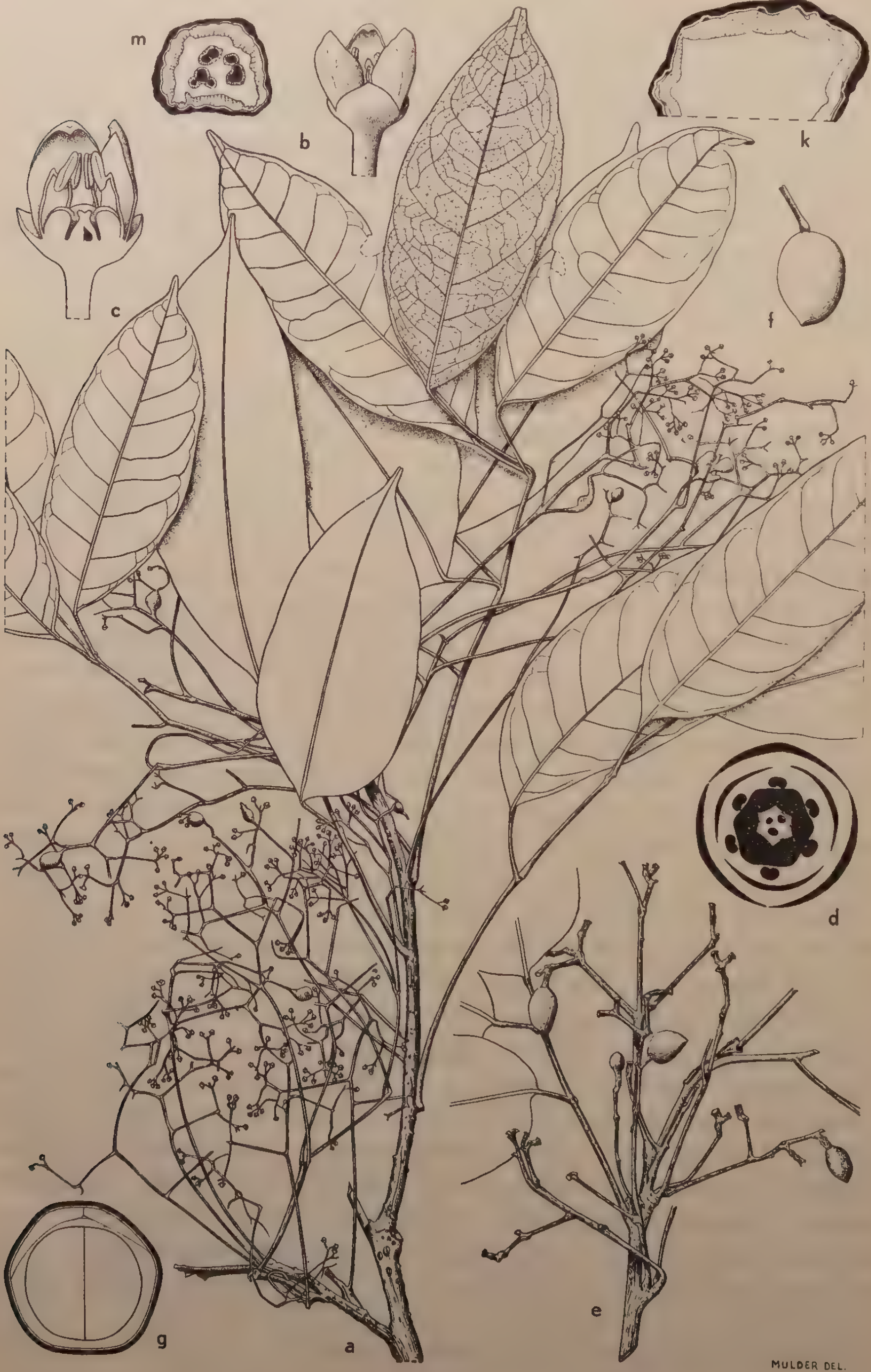
¹) This is also known in some *Dacryodes*-species.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0.2 cm longa, tenuia, apice minute inflexo-incrassata, subimbricata. *Stamina* 6 monodynamia glabra; filamenta filiformia basi libera; antherae ovoideo-oblongae. *Discus* crassus 6-undulatus. *Ovarii* rudimentum stigmate 3-lobo brevi suffultum triloculare sterile haud vel vix e disco exsertum.

The second specimen known possesses fruits, according to which the description may be augmented as follows:

Leaves as in type specimen, rather broad, the acumen of the leaflets up to 2 cm long. *Infrutescences* branched from the very base, glabrous, about 10 cm long. Fruiting *calyx* hardly enlarged. *Fruit* ovoid or slightly oblique, glabrous, the apex subacute, 1.2—1.6 cm long, 0.7—1.1 cm in diam.; pericarp thin, the pyrenes and the septa extremely thin; seed solitary (the two other cells being sterile), ovoid, the cotyledons thick, entire and plano-convex.

Celebes: Central Celebes, Malili, Kawata, nr. Tolé-Tolé, scattered in old forest on steep slope, about 250 m in alt. (Forest Research Inst. Cel./V—208 [1]). *Type specimen*; tree 25 m high, bole 15 m high, 0.56 m in diam. at 1.8 m from bottom; young flower buds green, on Oct. 25, 1932, with a smell of manggo leaves, flowers [male] yellow, on Nov. 9, 1932 and Nov. 9, 1933, with a smell of manggo flowers, sterile on Aug. 23, 1934; nat. [To Bela] names: *bakata poeté* [To Padoē dialect], *toemoni poeté* [To Koronsiĕ dialect]); same locality 200 m in alt., same habitat (For. Res. Inst. Cel./V — 312 [1]), tree 25 m high, bole 10 m high, 0.35 m in diam. at 1 m from bottom and 0.3 m below first branch; fruit brown when young, almost black when ripe, on March 31, 1934, sterile on Aug. 23, 1936; same nat. names).

Moluccas: Res. Ternate, Batjan (For. Res. Inst. bb. 16456?; part of leaf only; nat. [Tern., Galela dial.] name: *palamkokotoe*).

Possibly the specimen from Manado (RIEDEL), quoted in my earlier paper (Bull. Jard. bot. Buitenzorg, Sér. III, Vol. 12, 1932, p. 418) has to be inserted in this species and not in *H. moluccanus*. Cf. also the Batjan specimens, quoted earlier under 14. *Haplolobus* spec. (l.c., p. 419).

Remarks. H. celebicus is closely related to *H. moluccanus,* from which it differs by its smaller leaflets, fewer secondary nerves and free filaments.

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[1] Numbered tree in forestry experimental plot.

Haplolobus celebicus, n. sp. — *a.* branchlet with leaves and male inflorescences (with galls); *b.* male flower outside; *c.* ditto, longitudinal section; *d.* diagram of male flower; *e.* infrutescence; *f.* fruit; *g.* ditto, cross-section; *k.* cross-section of branchlet; *m.* ditto of petiole — *a—d, k, m* after type specimen; *e—g* after F. R. I. Cel./V — 312).

STUDIES IN PHYLOGENY

I.

On the relation of Taxonomy, Phylogeny and Biogeography[1]

by

H. J. LAM

(National Herbarium, Leiden).

> "Namentlich die Biogeographie ist ohne die "Geschichte der Organismen, die ja zugleich "die Geschichte ihrer Verbreitung ist, gar "nicht zu verstehen". (ADOLF MEYER, Logik der Morphologie, etc. 1926, p. 233).

Summary.

Taxonomy is static, its symbols are therefore two-dimensional, representing 1. differences or resemblances and 2. diversity (eventually are also area). Phylogeny is dynamic and its symbols are three-dimensional, representing 1. Time, 2. differences or resemblances and 3. diversity (eventually also migration). The term *"genorheithrum"* is proposed for a "stream of potentialities" as a phylogenetic unit in the Time. Taxonomic units are cross-sections through genorheithra, the boundaries of which are discontinuities of various kinds. A new discontinuity originates, as a rule, from a great number of potentialities (not from a single [pair of] parents). This implies the probability of polytopy as a common phenomenon, and also the supposition of a minimum of genetic property, below which a discontinuity is not viable. Natural extinction may be largely due to the loss of potentialities. — Corresponding reasonings may be applied to Biogeography, which may be static (floristics and faunistics) or dynamic (migrations). Taxonomic units are represented here by areas, the rate of extension of which may be a function of the number of potentialities. The forces, influencing the motion of any point of an area boundary are briefly summarized in a table, demonstrating the embarrassing complexity of WILLIS' statistical methods. In addition, the "law of BEYERINCK" is formulated anew on a broader basis. Disappearing of areas may be due to two causes: extinction of the units (loss of potentialities), or dissolution into new units (areas). The minimum of potentialities mentioned finds a geographic analogon in the law of the minimum area, established by PALMGREN.

As I have pointed out in a previous paper (lit. [2]) 16, p. 178 ss.), taxonomical and phylogenetical considerations, schemes and symbols have, in my opinion, to be sharply distinguished, and in symbols to every distance and angle a definite significance has to be attributed, if possible.

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[1]) I have to express my sincere thanks to my friend Prof. L. G. M. BAAS BECKING fir kindly correcting the English.

[2]) At the end of Nr. II.

Taxonomy is the expression of momentary relations between concrete or abstract items which are found or brought together. It is nothing but classification. A classification, however, may be senseless or may have a certain leading idea as a basis or a frame and may, in the latter case, more or less claim the epithet "natural". As has recently been recalled in a clear and fascinating way by GILMOUR, a system is the more natural as a more important character has been chosen as a base for the classification; and a character is the more important, as it is more fundamentally connected with the origin or the (main) purpose of the unit in which it is incorporated. However, as GILMOUR states, there are no sharp boundaries and no essential differences between artificial and natural systems, no more than between taxonomy of inanimate and of animate, of concrete and of abstract things. A taxonomic scheme is the expression of relations at one moment and is therefore static; it is an instantaneous photograph of a moving object. It may therefore be symbolized by a two-dimensional figure. In Taxonomy we can never speak of kinship, but merely of resemblances or differences. The significance or the cause of these resemblances or differences cannot be stated by direct methods, as they cannot be concluded from data available in the system.

The mutual relations of taxonomic units may be indicated by a natural system, situated in a plane, which represents the moment of observation. Their relative diversity may be represented by the surface occupied by their symbols (delimited by circles which symbolize their discontinuity), their differences (or resemblances) may be represented by their mutual distances. However, such an arrangement cannot be but the product of intuition, as for each character incorporated in a system, another dimension is needed. It can therefore, as a rule, not be established on the basis of one of the exact methods. If one single character is taken to base the system upon, a linear arrangement is obtained. With two independent characters, the place of each object is defined by the coordinates in a plane. At the utmost three independent characters can be taken into account, viz. in a three-dimensional stereometric figure with three coordinates. As this method gives only small and relative advantage, and the third dimension, as will be shown below, is to be reserved for a special function, two-dimensional schemes are preferable for symbolizing static relations. However, as it is often desirable that more than 2 characters be incorporated in order to obtain a natural taxonomic arrangement, the only remaining method is that a certain, more or less arbitrarily chosen object be taken as a "standard object", around which all other objects may be arranged according to the number of characters they have or have not in common with it (cf. lit. 16, figs. 28b and 28c). The choice of the object can be based upon the sharing and participation of features (lit. 16, p. 183) or upon the importance of certain features.

It is, however, not my intention to discuss the nature of these taxonomic units here. Whatever they may be called and whatever their numerous definitions may be, for our present purpose it may be sufficient to state that they are delimited by discontinuities, i.e. by more or less sudden "gradient" of the greater number of their fundamental characters.

The distinguishing factor of Taxonomy towards Phylogeny is, as I see it, the factor Time. If taxonomical schemes are symbolized by two-dimensional figures in a plane, the Time factor must be thought perpendicular to that plane. Phylogenetic symbols must therefore make use of three dimensions, one of which is always Time. This Time Coordinate which is considered as constant, is crossed by innumerable Time Levels, in each of which a momentary taxonomic scheme may find its place. Phylogeny considers changes from Time Level to Time Level, from taxonomic scheme to taxonomic scheme, from one phase of a character to a next one, i.e. it considers kinship and is therefore dynamic. A relation along the Time Ordinate should mean a static condition (no evolutionary change), a line perpendicular to the Time Ordinate and therefore situated in a Time Level should represent a sudden change (at a certain time), e.g. a mutation; any angle with the Time Axis should indicate a resultant of Time and change and by its width the rate of evolution should be expressed (lit. 16, fig. 31).

Taxonomic schemes are therefore cross-sections through phylogenetic schemes. As the Time can never be eliminated from human interpretations of the Universe, Phylogeny is primary to Taxonomy and represents the more general case, while Taxonomy has to be considered as an interpretation of a temporal condition.

What has been said above concerning Taxonomic units, is also true for Phylogenetic ones. Whereas Taxonomy is based upon characters, Phylogeny is based upon changes of characters, i.e. upon evolutionary processes. As characters are, in some way, the materializations or functionalizations of genes or of combinations of genes, and these may be called potentialities in general, we can imagine the units of Phylogeny as "streams of potentialities", drifting by the power of Time. As we observe discontinuities in their cross-sections, they must be delimited by discontinuities also, and, as the term "*line* of evolution" does, I think, not satisfactorily fit the ideas, developed in this paper, I would, in accordance with the terms "mono-, bi- and polyrheithry" proposed by me in an earlier paper (lit. 16, p. 189), introduce here the term "genorheithrum" for such a stream of potentialities. As may already be stated in their cross-sections (the taxonomic units), their discontinuity may be sharp or vague. The discontinuity, which is based upon hybridization possibilities (lit. 5), though far from sharp in itself, may be considered as the most reliable and most comprehensive discontinuity to constitute genorheithra. I would, in this connection, recall the schematical "cross-section" through a genorheithrum by Shull (quoted in lit. 16, p. 186, note). A genorheithrum might be considered as consisting of genes (or potentialities), which are more or less closely and indissolvably linked to each other. Whether this linkage shows any periodicity may remain undiscussed here, but it may be recalled that, in my opinion, *there is no essential difference between linked and unlinked genes.* Those genes which are not closely linked are constituting what has been named "Erbstock" (Plate, quoted by Lütjeharms, lit. 19, pp. 187—188) or "radicals" (Vavilov, see lit. 16 and 19), but the differences in "linkage-power" and "dissolution-time" is, I think, showing a regular gradient or at least regular and small steps from the oldest and most solid "Erbstock" towards genes which are situated more near the "surface" of the genorheithrum, i.e. genes which are (still) more liable to participate partly or totally independently in hybridization. In a previous paper (lit. 14, p. 190) the same view has been put forward in regard to characters of subsequent rank, i.e. to materializations of genes.

I am inclined to consider this process also as a function of time and I might recall the attempt made by Blum (quoted in lit. 16, p. 173) to gather both inorganic and organic evolution under the same explanation. Whether this explanation (the law of entropy) be correct or not, there is certainly a striking simile between atoms and genes, inasfar as both may be thought as "bodies" with a smaller or greater number of unsaturated affinities which strive for being occupied. We do not know whether there is more than an analogy in this resemblance and the gap between the animate and the inanimate is still insuperable.

As long as this gap is not bridged, we will not be able to say whether the origin of life was broadly or narrowly grounded, mono- or polyphyletic, restricted to one period or of all times. Yet, it may be supposed that Life is a special condition of matter which may be attained in various forms (of which we only know a single one) and in all those cases, when a certain "level" — the nature of which is still a mystery to us — is reached.

Whatever, for the rest, the internal factors may effectuate, concerning external or environmental ones (which are, perhaps, nothing else but complexes of *other* internal factors), *the rule of* BEYERINCK, running: "Everything is everywhere, but the environment selects", raised to the rank of a law by BAAS BECKING (lit. 1, p. 8, and 2, pp. 13—15; cf. also TAN, lit. 28, p. 116), *is possibly still more valid in regard to genes than to organisms.*

It might be suggested that sexual discontinuities should guard a genorheithrum against the escape of potentialities. Although there may be a certain protection in this sense, it becomes, I think, only more effective with age. *As I see it, a discontinuity — say a "species" — does not originate, as a rule, from a single parent or a couple of parents, but from a great number of potentialities.* This may be true if hybridization is the agent, but I see no reason why it would not be true also if the "new species" would originate as a mutant or as the product of poly- or heteroploidy. Whether induced by environmental conditions or not, I suggest that the origin of species is at least as much (if not more) a matter of time (or "maturity" or "periodicity" or "internal factors") as of anything else (external factors). I think — in contradistinction to the views of WILLIS — that most and perhaps all of the surviving new "species" (DANSER's comparia or commiscua, lit. 5) are disposing of a rich property of genes, *of which an arbitrary individual is only comprising a certain part.* I would also suggest that *the viability of a discontinuity is, in a way, proportional to the number (and also the quality?) of potentialities*¹) *it has at its disposal. Consequently, it might be suggested that there is a certain critical minimum in this number, below which a new "species" either never arises, immediately disappears or is doomed to perish.* At any rate, a true sexual discon-

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¹) Cf. E. ANDERSON (Bot. Review 3, 1937, 335 and Amer. Naturalist 71, 1937, 223), who showed that the area of the tetraploid individuals of a species is often considerably larger than that of the diploid ones. According to the investigations of O. HAGERUP (Hereditas 16, 1932, 19, and 18, 1933, 122) polyploid species and individuals are, ecologically speaking, stronger than diploid ones.

tinuity, once in existence, cannot but become poorer in its genetic property, unless new genes are originating, of which, I think, we know nothing as far as an existing discontinuity is concerned (cf. Danser, lit. 4, p. 34, and 5, pp. 409, 432). Apart from unknown causes, this impoverishment can be effected by catastrophal destruction of individuals (tectonic and volcanic processes and other sudden geological changes), but also by the escape of potentialities. In young discontinuities, there will be little chance for such an escape, but with age internal and external factors (isolation) may cooperate in severing parts of the genetic property. If similar combinations of genes are isolated at various places but in one and the same discontinuity, we speak of *polytopy*, which I think is very frequent but uneffective in young, ever less frequent and more effective (towards the origin of species) in older genorheithra. If the isolation of potentialities is taking place in two or more sexual discontinuities, we call it *bi-* or *polyrheithry*, which may be mono-, bi- or polytopic. Polyrheithry will, as a matter of course, be a more rare phenomenon than polytopy, as the chance that similar combinations of potentialities originate from two or more groups of potentialities is the smaller, the less potentialities these groups have in common. And they have, as a rule, the less potentialities in common, the longer they are sexually discontinuous. Of course polytopy and to a lesser degree also polyrheithry is not necessarily restricted to one and the same Time Level. If the time difference is large, this point may be of importance for the reliability of guide fossils.

According to the views mentioned above, it must be concluded that discontinuities may become so poor in genetic property that they are no longer viable. *The loss of potentialities (number and quality) may be one of the main causes of "natural" extinction.* This is, however, a matter which urgently requires a closer investigation, in which the palaeontologist may contribute a good deal of evidence. Tan (lit. 28, pp. 116—117) has shown that certain Foraminiferae are suddenly disappearing as soon as a certain final phase (even of a single feature) has been attained. The proportional influence of "number" and "quality" of genes on extinction is still entirely unknown. Age, furthermore, makes the discontinuities sharper, the distances between genorheithra greater. The chance for polytopy and polyrheithry is soon reduced to none and potentialities can no longer escape by this way.

Polytopy and polyrheithry are homologies. These may in some way persist for a long time. Analogies (which I consider as of genetic origin) are, in my opinion, merely unexplainable homologies. They may be found even between the most distant discontinuities. In most cases a genorheithrum which is doomed to perish, disappears soon, in a few cases it persists through astonishingly long times, such as *Ginkgo*. In some old genorheithra enough potentialities have apparently been preserved, so many that a new species explosion in a new area is possible (cf. lit. 18).

We have stated that there are both exact and intuitive methods in arranging taxonomic units and we have now to discuss the same theme concerning Phylogeny. The changes of characters, on which Phylogeny is based, may be investigated, as far as I can see, by means of three methods, (in addition to the methods of *morphology, ontogeny* and *teratology*), viz.:

1. *Genetical (and cytological) methods.* The advantage of these is that the phenomena are apparent and clear, but the great difficulty is to extrapolate the results into the past and relative to large differences.

2. *Palaeontological methods.* These are almost as exact as the genetic ones and they cover, moreover, the whole past. Unfortunately the gaps are large, and of large numbers of extinct creatures nothing is left. On the other hand, however, no other science yields so trustworthy and direct indications towards Phylogeny, since certain undisturbed beds in which certain groups of organisms were deposited in large numbers, with fairly constant rate and in horizontal layers, provide us with palaeontological evidence of the highest value. The palaeontologist is the only investigator who can directly interpret such fundamental data as the direction of an evolutionary tendency and changes in the evolutionary rate, as has been shown, for instance, by KAUFFMANN and by TAN; both of these authors are emphasizing the method of the phylogeny of single features in palaeontology. Environmental conditions, however, which may be studied both by method 1 and by method 3, are theory for the palaeontologist.

3. *Geographical methods.* These are less trustworthy as they are not direct but deductive. They are based upon the present distribution of succedaneous phases of characters (tendencies) (cf. lit. 14, 15 and 17).

With the last-named method Biogeography comes in. Also in this matter Time is a distinguishing factor; there is a biogeography of the moment and a biogeography in the time.

Taxonomy and Floristics (Faunistics) are static. The units are discontinuities in a taxonomic and a geographic sense respectively, i.e. species, etc. and areas. Floristics may study the distribution of species or of characters. An interesting analogy is found in the way in which taxonomic units (and areas) on one hand, and floristic regions on the other are delimited, viz. on the basis of sudden "gradients" of characters (taxonomic units and areas) and of specific areas (floristic regions).

Phylogeny and Historical Biogeography are dynamic. The latter considers migration of genorheithra (and dispersal of individuals). This is the field covered by WILLIS' theories of "Age and Area" and of "Size and Space". I need not recall the opposition and the criticism these theories have met with. Not only has WILLIS undoubtedly overestimated the bearing and the importance of his views and misused statistical methods, but the lecture of his reasonings made me often think of the story of the tall man who was asked why his legs were so long and who replied: "because short legs would not be long enough to reach as far down as the ground". I mean to say with this metaphor that WILLIS' reasonings are often sophisms, the invalidation of which is only obvious when they are pursued down to their very roots. While in many respects his book may have been a failure, one of its merits is certainly that it emphasizes the prime importance of the factor Time both for evolution and for migration. But, as has been repeatedly pointed out by several critics, every single case has to be separately considered, and the general rules, far from having the rank of the laws of Gravitation, of DARWIN's selection theory or of MENDEL's laws of hybridization, are too simple to require so extensive arguments.

The area of a taxonomic unit (as well as that of a feature and of a gene or of a group of genes), that has once come into existence and that is able to maintain itself, is subject to numerous forces, which are only partly known to us, but which may be classed into one of the following four categories (see Table I, p. 122).

The most ideal form of an area is a sphere. This is only very exceptionally realized for taxonomic units, though it is not uncommon in colonies (*Bacteria, Algae,* etc.). The most usual form is, as a matter of course, a surface, e.g. that of the earth, and its ideal form is a circle. However, the area of a taxonomic unit of living organisms is not static. Its boundary is incessantly moving, slowly or rapidly, on account of internal and external processes (among which migration and evolution are affecting all of the four categories mentioned), which processes are, in some way, a function of Time. The momentary movement of each point in the boundary of an area is a function of the rest of the positive and negative, internal and external factors, affecting that particular point at that particular moment.

TABLE I.

	Positive	**Negative**
Internal (relative to taxonomical units, individuals or features [genes])	1. Eurybiotic 2. Large ”viability“ (genetic property?; polyploidy, fertility, etc.) 3. Well adapted to transport	1. Stenobiotic 2. Small ”viability“ 3. Not or not-well adapted to transport
	Regulation by Environment (selection) and Time (elimination of differences)	
External (environment)	1. Ecological gradient none or weak (no barriers; also: no parasites; man: growing, preservation of nature, etc.) 2. Competition none or weak 3. Accessibility large	1. Ecological gradient steep (strong barriers; also: parasites; man: devastation of natural vegetations) 2. Competition strong (inorganic nutrition: root competition; organic nutrition: shadow) 3. Accessibility small or none (climax)

These few and simple considerations comprise, I think, the whole theory of floristics and faunistics, in a nutshell. The above table hardly needs any comment. The terms *eury-* and *stenobiotic* are self-evident; they mean to comprise the action and reaction between the taxonomic unit, the individual, the feature or the gene or group of genes and the whole of the environment. What I mean with ”*viability*“ is discussed above. ”*Ecological gradient*“ is an expression to symbolize the measure of change in the constellation of ecological factors. ”*Accessibility*“ is a term, proposed by J. HEIMANS [1]) to comprise all those factors (such as chance, in the sense of PALMGREN), which cannot be classed with any current category of ecological factors (climatic, edaphic, biotic), but which nevertheless may be of the utmost importance. And I would add here a formulation of the "law of BEYERINCK" so as to comprise taxonomical units, as well as individuals, features and genes:

Diaspores (and therefore potentialities) are principally everywhere, but the environment selects potentialities and time eliminates differences in migrating velocity and the influence of chance. Furthermore factors thusfar unknown have to be taken into account, which are related to the number and the quality of the potentialities dispersed.

In this form the rule is based upon the principles of POTONIÉ ("Die Samen kommen im Prinzip überall hin"), BEYERINCK (principally for micro-organisms, cf. lit. 1 and 2) and PALMGREN (lit. 22).

In the above I have put forward the thesis that a new "species" may, as a rule, originate from a large group of potentialities. This implies the possibility, though not the necessity, that the specific area which comes into existence with the species, may be rather large, though of course smaller, and probably considerably smaller, than the parental area. In general, however, I think, a new area will not be very large and this is necessarily true in small islands and other regions which are ecologically isolated. What happens to an area of a new genorheithrum, depends upon innumerable factors, internal and external. In many cases the area may soon disappear, but if it succeeds in maintaining itself, it will try to extend and to occupy as much space as it can. In other words: in the last-named case it will increase with age. This is one of the simple truisms of WILLIS' theory. But as an area may start as a relatively large one, size cannot tell us, *in general*, something about age. Whether the new discontinuity enriches its genetic property at the expense of other discontinuities or whether latent genes are activated, it may be accepted that an explosion of diversity is following, possibly partly induced by environmental conditions (migration into new regions, etc.). In other words: its size increases with space. This is another one of WILLIS' truisms. But the development of an area has a very much complicated history, and what happens further to the genorheithrum and its area, depends upon specific and even individual conditions concerning affinities and linkage of genes, evolutionary rate or periodicity, environmental factors met with during migration or changing factors while staying at the same spot, etc. *It may be suggested that it is again the number (and the quality?) of its potentialities, which is responsible for the rate of its extension, which rate is one of the manifestations of its viability.* All kinds of areas may be imagined, as there are all kinds of taxonomic units: rich and poor, large and small, long living and soon disappearing. At any rate, however, an increase must sooner or later be followed by a decrease. This decrease may have two causes; one is the loss of potentialities and the natural extinction, which may take a short or a long time. This is what happens, I think, to slowly changing old and relatively poor genorheithra with sharp discontinuities. It may be also found in such taxonomic units which (still) cover a large area but are very rare (reduced in number) either in a part of their area (regression; cf. Stud. in Phylog. II) or everywhere. The other way is a rejuvenation; the area is disappearing because the original definition of its taxonomic unit no longer fits, as it is evolving into one or dissolving into more new discontinuities. This is, I suppose, what happens to rapidly evolving and rich genorheithra. *The condition just mentioned, may be the main cause of the fact, that young (neo-) areas are apparently more frequent than old (relic) areas.* A remarkable example of coexistent small relic-areas, large areas and small neo-areas has been given as early as 1869 by **KERNER**.

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[1]) in "Nederl. Kruidkundig Archief" 44, 1934, 96 and in "Biologisch Jaarb." (Dodonaea) 4, 1937, 180.

An interesting floristic analogon with the idea of a "minimum number of potentialities" is found in the law of the minimum area, and of the proportional relation of the extensiveness of the region and the number of species, it may contain, established by PALMGREN (lit. 22, pp. 28, 76, 104, 120—125).

As the increase of area and of diversity are sometimes developing at about the same rate, viz. in well-delimited larger taxonomic groups and in well-delimited floristic regions, the same symbol may represent both items. This has been applied by me in a previous paper (cf. lit. 15); a new application may be found in the next "Study", in which some of the theses laid down in the present one, are illustrated.

The following scheme gives a survey of some of the ideas, mentioned above (Table II):

TABLE II.

General case	Special case
Dynamic through the Time factor	*Static,* considering the conditions of one moment
Symbols three-dimensional, comprising 1. Time; 2. difference or resemblance; 3. diversity (eventually also migration)	*Symbols* two-dimensional, comprising 1. difference or resemblance; 2. diversity (eventually also area)

Historical Biogeography	**Phylogeny**	**Taxonomy**	**Floristics and Faunistics**
migration (dispersal)	genorheithra	taxonomic units	areas (distribution)
	kinship	resemblances (differences)	
migration of characters	changes in characters	characters (materializations or functionalizations of genes or combinations of genes)	distribution of characters
Analoga:		Analoga:	
minimum area (PALMGREN)	minimum genetic property	boundary of taxonomic units by ”gradients“ of character boundaries	boundary of floristic regions by ”gradients“ of areal boundaries

STUDIES IN PHYLOGENY.

II.

On the Phylogeny of the Malaysian Burseraceae-Canarieae in general and of Haplolobus in particular

by

H. J. LAM

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> "One should not make the mistake of draw-
> "ing final conclusions on the basis of the
> "present-day distribution of anyone group
> "of organisms... and much less on any
> "single family or genus ...". (MERRILL,
> Gardens' Bull., Straits Settlem. IX, 1935,
> p. 51).

Summary.

The Burseraceae comprise 3 tribes which show an increasing differentiation from West to East and have, accordingly, their points of gravity in America (*Protieae*), Africa (*Bursereae*) and Asia to Australia-Polynesia (*Canarieae*) respectively. An eastward migration of the order is probable. The easternmost tribe comprises 5 genera, viz. *Scutinanthe, Canarium, Santiria, Dacryodes* and *Haplolobus*. These are tested regarding their fundamental characters, in order to calculate their "phase indices". In these calculations 1 (of the series 1, 1½, 2, 2½, 3) means the most primitive, 3 the most advanced condition of a feature. From the figures thus obtained and from geographical data, it is concluded that *Haplolobus* (area: Borneo to New Guinea inclusive; *map 1*) is the youngest genus of the five, whilst the four others must have originated in East Asia more or less simultaneously from the "Procanarieae" which where at that time still closely related to the ancestors of *Garuga* (*Protieae*). It is further evidenced both by the characters and by area disjunction that *Haplolobus* must have originated bi- or polytopically from *Santiria* in Eastern Malaysia. *Santiria* shows a recent species explosion in the Sunda Land, *Haplolobus* in New Guinea (*map 2*). In "Wallacea" the last-named genera are apparently either in regression (*Santiria*) or scantily developing (*Haplolobus*).

The paper proceeds with considerations on migration tracks in Malaysia and adjacent regions (*map 3*), checked by a short survey of the geological history since the early Tertiary. From the last-named survey it is concluded that three different areas are in the way of genorheithra, migrating either eastward or westward in Malaysia, viz. 1. the old and large continental Sunda Land which enabled rapid migrations and large "species explosions"; 2. "Wallacea" which with its continuous insular character has always been a serious impediment to migrations and which consequently is to be considered as a sieve for potentialities; and 3. the Sahul Land which is also continental, but younger and smaller than the Sunda Land. These conditions (among others) are responsible for the fact that so much more Asiatic types have reached Australia and Polynesia than Australian types reached Asia. The paper closes with a tentative reconstruction of the tertiary and quaternary phylogeny of the Canarieae in the region under discussion (*fig. 1*).

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1. INTRODUCTION.

If, in spite of MERRILL's admonition, quoted as a motto at the heading of this paper, I venture to make a tentative phylogenetical reconstruction of a part of a natural order, which is more or less familiar to me, it is because I hope to add a humble stone to that splendid and solid foundation of Malaysian Phytogeography, of which MERRILL is one of the most prominent constructors and one of the most competent and zealous promotors. For I think that a small number of well-checked and well-interpreted data from a thoroughly known group are at least as valuable towards historical biogeography as a great number of facts on a less trustworthy basis.

If we desire to obtain an idea on the phylogeny of a given group, we have to investigate, as far as possible, something like the following points:

1. Systematic position of the group as a whole towards related groups;
2. Systematic position of the components of the group mutually (sharing and participation of characters) and eventually in relation to other groups;
3. Specific density of genera (or generic density of families) in various parts of the area now occupied;
4. Geographic distribution of the group and of related groups;
5. Geographic distribution of components of the group;
6. Geographic distribution of some important characters;
7. Geographic distribution of subsequent phases of characters;

8. Means of dispersal;
9. Eventual fossils;
   and some still more uncertain data such as palaeo-ecology, evolutionary rate, contingencies, etc.;

and, on the basis of the foregoing points:

10. Relative age of the groups in the region;
11. Relative age of the components of the group;
12. Supposed migration of ancestors, in accordance with geologic history, etc.

These points will be dealt with underneath as far as data are adequate and investigable. As a matter of course, phylogenetic reconstructions can only be fertile if they are based on a sound and thorough taxonomic and geographic knowledge of a natural group and if they are not in contradiction with geological results; they may be of some value only when they yield any results of wider scope or demonstrate methods of wider applicability.

2. THE BURSERACEAE AS A NATURAL ORDER.

The natural order of the Burseraceae may be subdivided into three tribes, which show an increasing differentiation from West to East and which have, accordingly, their points of gravity in Tropical America, Tropical Africa and Western Asia, and East-Asia to Polynesia respectively:

TABLE I (cf. lit. 12, p. 301).

Regions / Tribes	Trop. Amer.	Trop.Afr. & West-Asia	East-Asia & Polynesia	Total
Canarieae	2	38	**148**	188
Bursereae	± **100**	**163**	1	± 264
Protieae	**92**	4	8	104
Total. . . .	± 194	205	157	± 556

These conditions strongly suggest that the Burseraceae originated in Tropical America and, in general, migrated eastward, a suggestion which has been discussed more in detail in a previous paper (lit. 12, pp. 298—306). The above table therefore corresponds, in general, to the fundamental typological phylogenetic scheme in connection with migration (cf. lit. 16, p. 179 ss. and 15, p. 111).

Having started probably some time in the Cretaceous, this migration must have been rather rapid, as the only fossils attributed to this family (and to the tribe of the Bursereae) are of Miocene age (Germany) and *Canarium* cannot have reached the North-Eastern boundary of the "Melanesian continent" much later than some time during the same period (cf. § 6 Geological evidence). Not only migration, however, but also evolution must therefore have proceeded with considerable speed, as *Canarium* shows, of all genera, the largest number of advanced character phases.

3. THE TRIBE OF THE CANARIEAE.

I will restrict myself in the present paper to the tribe of the *Canarieae* and more particularly to that part of it which is found in Eastern Asia, Malaysia and Polynesia. The central problem will be to give a tentative reconstruction of the phylogeny of the genus *Haplolobus*. This problem, however, will find its frame in a similar reconstruction of the very natural group of the Malaysian and Polynesian Canarieae.

As has been shown above, the Canarieae actually have their centre of gravity in Eastern Asia and Polynesia. The following table shows some more details concerning the distribution of their diversity:

TABLE II.

Regions / Genera	Trop. America	Trop. Afr.	Mad & Masc	Trop. Asia, Austr. & Polynesia	Total
Haplolobus	—	—	—	**13**	13
Scutinanthe	—	—	—	**1**	1
Canarium . . . . (incl. Canariellum)	—	8	5	**102**	115
Santiria	—	6 1)	—	**18** 2)	24
Dacryodes	2 3)	**19** 4)	—	14 5)	35
Total . . .	2	38		148	188

---

1) Sect. Santiriopsis — 2) Sections Eusantiria and Trigonochlamys — 3) Sect. Archidacryodes — 4) Sect. Pachylobus — 5) Sect. Curtisina.

It appears from this table that the tribe comprises in Tropical America only 1, in Africa etc. 3 and in Asia, Australia and Polynesia 5 genera. The monotypic genus *Canariellum* from New Caledonia has been included in *Canarium*, as it is insufficiently known and as its distinguishing characters (unifoliolate leaves, two-celled fruits) are not uncommon in some representatives of *Canarium* (cf. lit. 17). In the tribe the last-named genus is distinguished by a bony axial intrusion between the bony pyrenes, which are connate with that intrusion, so that a usually hard and solid putamen is formed. On account of this important feature — which finds its counterpart among the Bursereae — I created the subtribe of the *Eucanariinae*. The four other genera, which lack such an axial intrusion are then forming the subtribe of the *Dacryodiinae*. Of these, *Scutinanthe* is rather divergent both by its features (5-merous flowers with receptacle, pyrenes bony and connate with a bony mesocarpium) and by its distribution (Ceylon, Malaya, S.E. Sumatra, Borneo). The three other genera, *Dacryodes*, *Santiria* and *Haplolobus* are closely related, particularly the two last-named ones, as *Dacryodes* is more tending towards *Canarium* in various features. In general, the taxonomic relations of the genera may appear from table III (p. 131).

As may appear from this table, the sharing of the fundamental characters is rather irregular. This and the fact that some of the fundamental (nrs. 2, 4, 7 and 9) and many of the less important characters not mentioned here show transitions from one genus to one or more others, shows that the evolution of the group is probably in full swing and its present configuration of probably recent date. This is probably especially true for the genera *Dacryodes, Santiria, Haplolobus* and *Canarium*; *Scutinanthe* shows a singular mixture of primitive and advanced character phases and its average phase index is therefore little significant. I consider its classification with the Canarieae as a rather artificial one. Its flower strongly recalls that of *Garuga* (Protieae) and its fruit may have been subject to a development parallel to that of the Canarieae. It might be considered as a sort of tentative canarioid fruit, in the way the *Pteridospermae* showed a tentative gymnospermy. Detailed evidence concerning these tendencies may be found in lit. 14 (regarding character 5: pp. 155—158, cf. also SINIA; char. 11: pp. 159 ss.; and char. 12: pp. 171 ss. and 184) and in lit. 17 (regarding character 9).

In the paper already mentioned (lit. 14) I have placed the Malaysian genera of the Burseraceae in regard to a still greater number of tendencies, viz. 23. The phase of each genus in a certain tendency was

TABLE III.

Genera / Characters	Dacryodes	Santiria	Canarium	Scutinanthe	Haplolopus
1. Axial intrusion extant or not in fruit	none	none	**extant**[1]	none	none
2. Pyrenes ± free or connate	± free	± free	**connate** with axial intrusion	**connate** with bony mesocarp	**connate**
3. Pyrenes: constitution	± cartilaginous	bony	bony	bony	**papyraceous**
4 Stigma on fruit	± apical or nearly so	**excentric**	apical	apical	apical or nearly so
5. Cotyledons: shape	compound or lobed	lobed	compound or lobed	**entire**	**entire**
6 Cotyledons: folded or flat	folded	folded	folded	folded	**flat**
7. Receptacle in the flower	slightly developed (esp. ♀ fl.)	slightly developed (esp. ♀ fl.)	slightly developed (♀ flowers)	**extant**	none
8. Number of flower parts	**3**	**3**	**3**	5 (carpels 3)	**3**
9. Number of steeds in the fruit	**1** (rarely 2)	**1** (rarely 2 or 3)	3—1	**1** (rarely 2)	**1** (always)
10 Stipular organs	none	none	usually **extant**	none	none
11. Resiniferous vasc. strands in the medulla of the branchlets	extant in 7 (out of 14) species	extant in 3 (out of 18) species	**extant** in almost **all species**	none	extant in only 1 species (out of 13)
12. Ditto in the petioles	reduced in 6 species	reduced in 8 species	**numerous** in almost all species	none	reduced in 6 species

---

[1]) Heavy type indicate advanced phases.

indicated by one of the numbers 1, 1½, 2, 2½ and 3, of which 1 represented the most primitive and 3 the most advanced condition (l.c., table on p. 186). From these calculations the following figures may be derived, representing the average phase indices for the 5 genera under discussion concerning all the 23 tendencies:

1. Canarium: 1.93
2—3. Santiria and Dacryodes: 1.69
4. Haplolobus: 1.65
5. Scutinanthe: 1.63

As a matter of course, these figures have only a relative significance; and as differentiation is, in general, a function of time, they may tell

TABLE IV.

Genera Characters	Dacryodes	Santiria	Canarium	Scutinanthe	Haplolobus
nr. 1 (Table III) .	1	1	3	1	1
„ 2 „ „ .	2	2	3	3	3
„ 3 „ „ .	1½	1	1	1	2
„ 4 „ „ .	1½	2	1	1	1½
„ 5 „ „ .	1½	2	1½	3	3
„ 6 „ „ .	1	1	1	1	2
„ 7 „ „ .	1½	1½	1½	3	1
„ 8 „ „ .	3	3	3	1½	3
„ 9 „ „ .	2½	2	1½	2½	3
„ 10 „ „ .	1	1	2½	1	1
„ 11 „ „ .	2	1½	3	1	1
„ 12 „ „ .	2	2	3	1	1½
13. various differentiations in the flower (androeceum, disk, etc.)	1	1½	2½	1½	1
Total . . .	21½	21½	27½	21½	24
Average . . . . . (first case)	1.65 (1.69)	1.65 (1.69)	2.12 (1.93)	1.65 (1.63)	1.85 (1.65)

us something about the relative age of the genera. It would then appear that *Canarium* as a phylogenetic discontinuity (a genorheithrum) is older than the four other genera, whose age is not very much divergent.

However, the figures mentioned are also based upon tendencies which may be of importance concerning the Burseraceae as a whole, but which are of smaller significance for the Canarieae of East Asia and Polynesia only. If we therefore apply the same method to Table III and add a few tendencies that may better be estimated by a number than described, table IV results (p. 132).

This table shows therefore the following arrangement:

1. Canarium: 2.12 (formerly: 1.93)
2. Haplolobus: 1.85 („ : 1.65)
3. Santiria: 1.65 („ : 1.69)
4. Scutinanthe: 1.65 („ : 1.63)
5. Dacryodes: 1.65 („ : 1.69)

The most striking feature of this arrangement is the position of *Haplolobus*, the young differentiations of which are more exactly appreciated.

As taxonomical data apparently cannot bring us nearer to the solution of phylogenetical questions, geographical evidence has to be introduced. And even then a number of uncontrollable points lead us to scepticism, e.g. the individual rate of evolution that may be widely different in related genorheithra, the influence of contingencies (Palmgren, lit. 23), the possible explosive outburst of new species in a newly gained part of the area, etc. In regard to the last-named point, it may be recalled that Merrill (lit. 20, p. 146; lit. 21) has shown on various occasions that at least two big centres of dispersal are to be traced in Malaysia, viz. one in the Sunda Land and one in the Sahul Land (New Guinea and North Australia; Merrill calls this Papualand, but as the names Sunda and Sahul are traditional counterparts, I prefer to maintain them). I may add (cf. *map 3*) that the Philippines may form a third centre (cf. Dickerson, fig. 10), or in general, that any region of a certain extent and of sufficient ecological isolation may form such a centre, whose importance towards this point is, according to Palmgren (lit. 22, pp. 28, 76, 104, 120—125), more or less proportional to the size of the region (i.e. island).

Table V (p. 134) gives the diversity of the five genera in East Asia—Polynesia:

TABLE V.

Numbers of species; endemics between brackets.

Regions / Genera	Total in Far East	Asia Cont. & Ceylon	West Malaysia			Centr. Mal.		East Mal.		Austr. & Polyn.
			Mal.	Sum.	Born.	Phil.	Cel.	Mol.	N.G.	
Haplolobus	13	—	—	—	1 (1)	—	1 (1 ?)	1 (1)	**10** (10)	
Scutinanthe	1	1[1]) (—)	1 (—)	1 (—)	1 (—)	—	—	—	—	—
Canarium (Canariellum incl.)	102	**20**[2]) (19)	12[3]) (1)	16[3]) (2)	**25**[3]) (9)	**19** (13)	11 (1)	**13** (2)	**18** (10)	**17** (14)
Santiria	18	—	10 (1)	10 (—)	**14** (5)	1 (—)	2 (—)	1 (—)	1 (1)	—
Dacryodes	14	1[4]) (—)	**11**[5]) (2)	8[5]) (—)	**11**[5]) (3)	4 (—)	1 (—)	—	—	—
Grand Total	148	22 (19)	34 (4)	35 (2)	52 (18)	24 (13)	25 (1+1?)	15 (2)	29 (21)	17 (14)

It may be seen that *Haplolobus* is endemic in Eastern Malaysia and Celebes, with a centre in New Guinea (cf. *maps 1* and *2*). *Santiria* and *Dacryodes* have evident centres in the Sunda Land and cross its limits only with a few species. I consider these "species explosions" as a product of the Tertiary and Pleistocene Sunda Land, when Malaya, West Borneo, East Sumatra and probably for some time also North or West Java were united.

As far as *Canarium* is concerned, this large genus, whose area reaches from West-Africa and Madagascar to Southern China, Palau, Samoa and North-Australia, seems to have found new stimuli for differentiation in almost every new area gained during its apparently rapid eastward migration (cf. lit. 17). It is not improbable that the last-named condition is due to the fact that especially *Canarium* fruits with their fleshy though resiniferous pericarpium are not seldom dispersed by fruit eating pigeons, megapodes and cassowaries (Ridley, p. 501 ss.)[1]).

---

[1]) Ceylon, Malaya, S.E. Sumatra and Borneo (1 sterile specimen) — [2]) 1 Sunda Land species in Andamans and Bengal — [3]) 3 widely spread species also in Java, moreover in Java 1 endemic with Sumatran relation and 1 Eastern element on Bawean Isl. The other genera are not represented in the Java flora except 1 species of *Dacryodes* (in West-Java only) — [4]) also in Western Malaysia — [5]) 1 species also in West-Java.

As a matter of course, the group of plants that may be called the East-Asiatic *Procanarieae* that reached the Far East must, in view of what is left or displayed in recent forms, at least have comprised such potentialities as might allow the origin and the maintenance of those forms. As has been mentioned above it must be accepted, in accordance with the results of the Tables III and IV and with the present areas and their supposed eastward migration, that *Dacryodes*, *Santiria* and even *Canarium* are, as genera, older than *Haplolobus*. As I have discussed earlier (lit. 12, p. 304—305), I accept for *Dacryodes* a trirheithric and for *Santiria* a birheithric origin. This implies at any rate (whether polytopic or not) an origin from genorheithra having at least enough genes in common to give rise in two or more regions to such taxonomic units as may be comprised by the same taxonomic definition. It implies also migration of such genorheithra, and if we find such relatively primitive genera as *Dacryodes* and *Santiria* as disjunct as they are and suggesting by their character phases and their distribution about the same evolutionary development and therefore possibly about the same age, we may accept a relatively old polyrheithric or polytopic origin as the most probable explanation for their disjunctions.

For *Canarium* such an explanation is not necessary; its area is much less disjunct and its sections are not geographically correlated in the way they are in *Dacryodes* and *Santiria*.

Some words must be added concerning the area of *Scutinanthe*. Both its systematic isolation and its disjunct area might suggest its nature of a relatively old relic, maybe as a consequence both of palaeoclimatological influences and of a restricted genetic property. Its disjunction cannot be explained on the basis of geologic history. The suggestion of its relic nature is supported first of all by its primitive features and further by the recent detection of the species in S.E. Borneo (Tanahmerah) where it is reported to be very rare. Though there is only one single sterile specimen available, its identification is pretty certain. The species seems to be frequent only in certain parts of S.E. Sumatra (Palembang); in Malaya it is rare, in Borneo very rare, in Ceylon rare. Moreover, in Ceylon it is an inhabitant of mountainous regions between 600 and 900 m, in the Sunda Land it is a tree from the lowlands.

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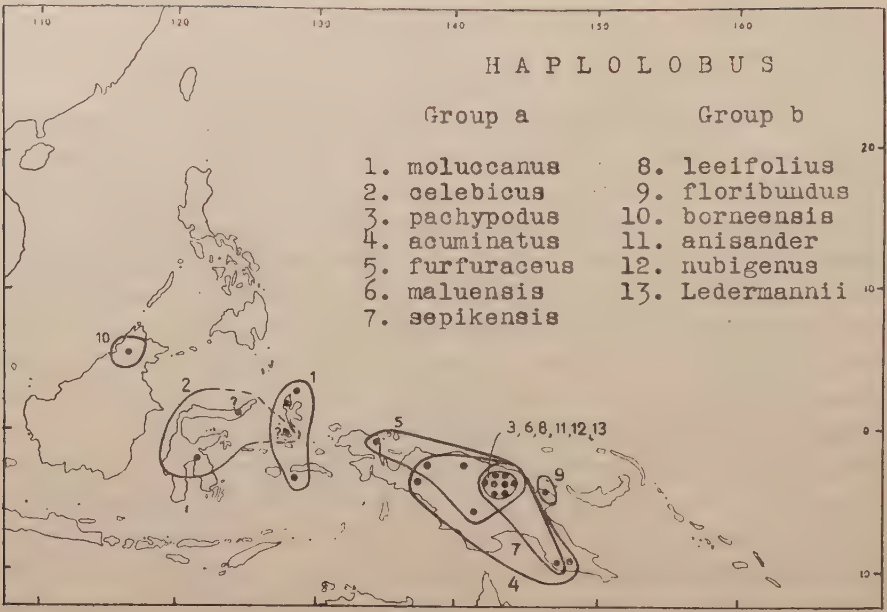
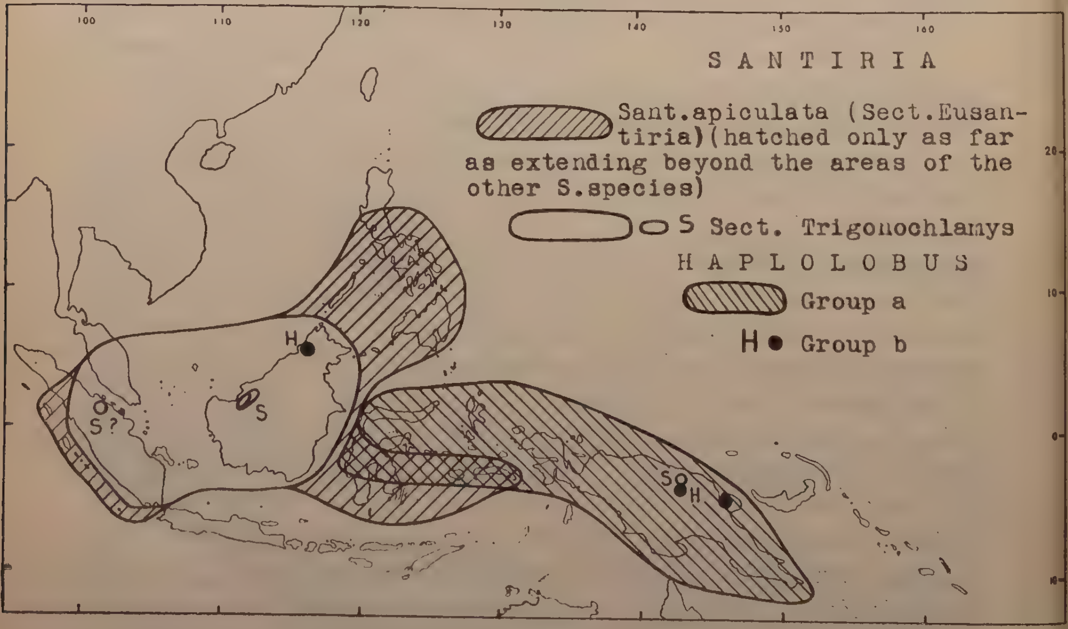
[1]) Probably *Garuga* fruits are also dispersed by birds.


HAPLOLOBUS
Group a
1. moluccanus
2. celebicus
3. pachypodus
4. acuminatus
5. furfuraceus
6. maluensis
7. sepikensis
Group b
8. leeifolius
9. floribundus
10. borneensis
11. anisander
12. nubigenus
13. Ledermannii
3,6,8,11,12,13
110
120
130
140
150
160
20
10
0
10

Map 1.


SANTIRIA
Sant.apiculata (Sect.Eusantiria)(hatched only as far as extending beyond the areas of the other S.species)
S Sect. Trigonochlamys
HAPLOLOBUS
Group a
H ● Group b
S?
S
H
100
110
120
130
140
150
160
20
10
0
10

Map 2.

The fact that *Scutinanthe* has retained the primitive character phase of 5-merous flowers (except the gynaeceum which is 3-merous, whilst the fruit is usually 1-seeded), means that the Procanarieae included the potentiality to produce 5-merous flowers. Regarding this feature, they were probably more closely related to the Protieae (*Garuga*, the flowers of which are strongly reminding us of those of *Scutinanthe*) than they are at present.

The primitive Asiatic Procanarieae might therefore have reached the Sunda Land in two closely related groups, which would nowadays perhaps be called genera, viz. one with the primitive characters of the 5-merous *Scutinanthe* (and *Garuga*) and with a tendency towards a canarioid fruit, and one with 4- or 3-merous flowers from which shortly after *Dacryodes*, *Santiria* and *Canarium* differentiated in the same way as they had done in Africa. From the latter group *Haplolobus* originated; in which way this probably happened, will be discussed later on. On account of both taxonomical and geographical arguments, I would therefore suggest the following order of origin in East Asia:

I a. Scutinanthe
Dacryodes
b. Santiria ± simultaneous
Canarium
II Haplolobus

4. HAPLOLOBUS (*maps 1* and *2*).

As far as *Haplolobus* is concerned, this genus now comprises about 13 species (cf. *map 1*), 10 of which are endemic in New Guinea, 1 in the Moluccas (Halmahera!, Morotai!, Amboina?), 1 in Celebes (Central Celebes!, North Celebes?, Batjan?) and 1 in North Borneo (Mt. Kinabalu).

Although all of these species are closely related, they seem to form two more or less distinct groups, both of which have disjunct areas. I will indicate these groups with the letters a and b and distinguish them in the following way:

Group a — Leaflets rather large to large (greatest length 17—38 cm), usually thin, glabrous or pubescent, the petiole with usually numerous, rarely less than 5 resiniferous medullary vascular strands. Inflorescences usually large (greatest length 12—32 cm) — 7 Species from New Guinea (5), the Moluccas (1) and Celebes (1).

Group b — Leaflets smaller (greatest length 6—15 cm), often rather rigid, always glabrous, the petioles always with very few (1—5) resiniferous medullary vascular strands. Inflorescences smaller (great-

TABLE VI.

Haplolobus.

Group	Characters / Species	Leaves		Petioles	Length (in cm) of inflorescences		Distrib.
		Length of leaflets (cm)	Glabrous or pubescent	Number of medullary vascul. strands	♂	♀	
Group a	1. moluccanus	24-38	glabr.	∞	23-32	?	Moluccas
	2. celebicus	9-21	glabr.	3-5	10-22	?	Celebes
	3. pachypodus	13-20	pub.	∞	4-12	?	N. Guinea (Sepik)
	4. acuminatus	6-20	pub.	∞	7-12	1-4	N. Guinea
	5. furfuraceus	8-19	pub.	5-10	-28	-28	” ”
	6. maluensis	5-18	glabr.	∞	5-13	3-10	N. Guinea (Sepik)
	7. sepikensis	7-17	glabr.	5-10	6-14	6-14	N. Guinea (Sepik)
Group b	8. leeifolius	6-15	glabr.	1-3	6 8	?	N. Guinea (Sepik)
	9. floribundus	6-12	glabr.	1-4	10-15	?	N. Guinea
	10. borneensis	4-13	glabr.	1-5	6-18	?	North Borneo
	11. anisander	6-11	glabr.	1	1-8	?	N. Guinea (Sepik)
	12. nubigenus	4-11	glabr.	1-3	1-3.5	1-3.5	” ”
	13. Ledermannii	2-6	glabr.	1-2	2-5	2-5	” ”

est length 2—18 cm) — 6 Species from New Guinea (5) and North Borneo (1).

Table VI gives some more details.

As appears from Table III, there is only one *Haplolobus* species, which possesses resiniferous vascular strands in the branchlets, viz. *H. pachypodus.* As the occurrence of such strands is to be considered as an advanced feature phase, *Haplolobus* is in a primitive condition concerning this tendency; next comes *Santiria* and finally *Dacryodes* and *Canarium.* Similar conditions are found in regard to such strands in the petioles. In both tendencies there is, moreover, a pretty distinct geographic correlation, inasfar as Eastern species usually show a more primitive, Western a more advanced phase of the features in question

TABLE VII.

Santiria.

Characters / Species	Leaves		Petioles Number of medullary vasc. str.	Length (in cm) of inflorescences		Distribution
	Length of leaflets (cm)	Glabrous or pubescent		♂	♀	
§ Eusantiria						
apiculata	6-18	glabr.	1-2	5-22	4-13	Malaya, Malaysia to Phil. & Molucc.
pilosa	7-19	pub.	1-2	7-20	5-14	Borneo
most other species	larger	gl. or pub.	5-10-∞	large	large	Sunda Land except Java
§ Trigonochlamys (all species)						
Griffithii	3-14	pub.	1-5	-20	-20	Sunda Land except Java
rubiginosa	4-12	glabr.	1-2	2-16	2-16	,, ,,
pedicellata	5-11	glabr.	1-2	?	5-13	Borneo
lamprocarpa	5-10	glabr.	1-3	1.5-8	1-6	N. Guinea (Sepik)
nana	2-5.5	pub.	1-2	?	1-1.5	Sumatra
minimiflora	3-5	glabr.	1-3	-6.5	?	Borneo

in either of the genera *Santiria* and *Haplolobus* (Tables VI and VII). It is, however, not apparent in *Canarium.*

It may further be stipulated, that similar conditions as are described for *Haplolobus* seem, *mutatis mutandis,* to be extant also in *Santiria.* In this more Western and probably older genus there are, namely, also two groups, which are ranked as sections and may therefore be accepted to be of older age than the groups of *Haplolobus.* They are, however, partly based upon similar differences and one of them has a distinctly disjunct area in exactly the same way as group b of *Haplolobus* (New Guinea:

Sepik region, and Borneo), as may appear from the following lines and from table VII (see page 139).

Santiria § *Eusantiria* — Anthers basi- to dorsifix; stigma of the fruit of variable position, from near the apex to near the base (*S. apiculata*!); tertiary nerves usually transverse, sometimes longitudinally reticulate (*S. apiculata*, *S. pilosa* and some others); filaments of the stamens inserted outside or on the disk, always 6 and monodynamous; inflorescences distinctly pedunculate, sometimes branched from the very base (*S. apiculata, pilosa* and some others); no receptacle in the flower.

Santiria § *Trigonochlamys* — Anthers adnate; stigma of the fruit not more than 90° excentric, usually much less; tertiary nerves parallel to the secondary ones, often longitudinally reticulate; filaments of the stamens inserted on the rim of the cupular disk; stamens usually 3, episepalous, rarely with rudiments of the 3 epipetalous stamens (*S. lamprocarpa, S. rubiginosa*), rarely 6 monodynamous stamens (*S. Griffithii*); inflorescences, at least the ♂ ones, branched from the very base; sometimes a receptacle extant (*S. lamprocarpa*, *S. rubiginosa* and *S. minimiflora*).

Whereas in *Haplolobus* the groups are still vaguely different and therefore probably young (it cannot be said that one of them is distinctly younger than the other), it is possible to say that of the two sections of *Santiria*, the section *Trigonochlamys* is distinctly showing the greater number of advanced character phases and is therefore probably the more recent one, as may follow from table VIII:

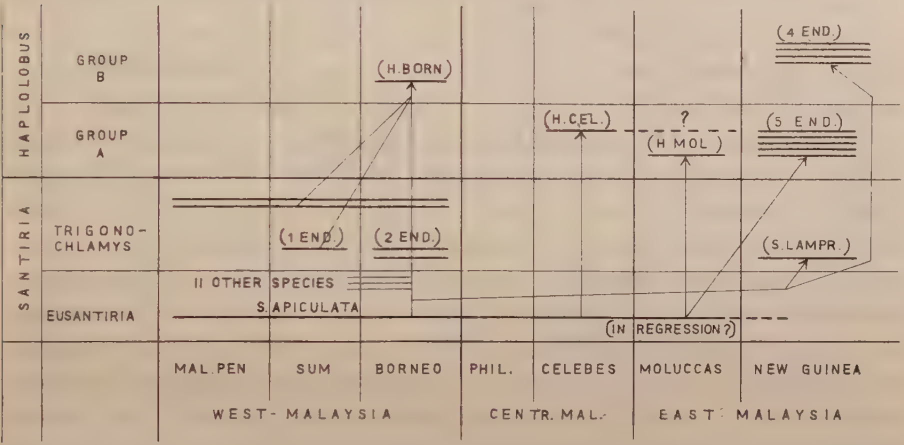
TABLE VIII (cf. table IV).

Santiria.

Sections / Characters	Sect. Eusantiria	Sect. Trigonochlamys
1. Anthers	1	2
2. Excentricity of stigma on fruit . . .	2½	1½
3. Insertion of filaments	1	2½
4. Inflorescences . .	1½	2
5. Receptacle . . .	1	2
Total	7	10
Average . . .	1.4	2

Regarding the only New Guinea *Santiria, S. lamprocarpa,* it may be stipulated that this species shows, to a certain degree, the slight development of a receptacle (♀ flower only), as is occasionally found in certain species of *Dacryodes, Santiria* and *Canarium* as a feature recalling *Scutinanthe* and *Garuga.* The excentricity of the stigma in the fruit is, moreover, in a comparatively primitive phase. Both characters suggest that the species was severed from its ancestors at a relatively early date.

I think the congruence of these facts is so striking that an explanation of the phylogeny of *Haplolobus* in connection with that of *Santiria* must be deemed probable about in the following way:



Note. Arrows indicate common ancestors, the point is directed towards the younger group. Present time and geographic area in the plane of the paper; the time as a factor is perpendicular to this plane (see Stud. in Phylog. I).

The above scheme demonstrates that I would accept a bitopic or even polytopic and a birheithric origin of *Haplolobus* on the basis of the older disjunction (and possible bitopy) of *Santiria.* This suggestion is further illustrated by *map 2.*

I hardly need to say that a dispersal of *Haplolobus* from New Guinea to Mt. Kinabalu by means of birds is most improbable, because of its almost dry fruits. Although an inhabitant of the high mountains, which harbours so many Papuan, Australian and even Antarctic elements, *Haplolobus* cannot be classed on the same terms with most of these mountain plants (cf. Merrill, lit. 20, pp. 92, 98, 99 and 102—103), also because it is not found at a higher altitude than 1500 m in Borneo and 1400 m in New Guinea.

As has been mentioned earlier, the centre of origin of *Santiria* must be located in the Sunda Land. Therefore, as both *Santiria*- and *Haplolobus*-potentialities have reached New Guinea, as is proved by the occurrence of endemic species of those genera in that island, an ancestral group of common potentialities must have covered an area connecting New Guinea with Western islands, say with the Moluccas and Celebes, although no present species showing such a connection are left. The only living *Santiria*-species with an area extending far beyond the "least common area" (cf. L. B. SMITH, p. 456) of the genus is *S. apiculata*. It is moreover the species of its section that is most closely related to the *Haplolobus* species of Group a. From the fact that *Santiria apiculata* seems to be much more frequent in the Western part of its area than in the Eastern, might be concluded that its area is regressive in its Eastern part. If this would be true, this circumstance could be interpreted as a remainder of the same process on a larger scale, phylogenetically and geographically, viz. regarding the common, ancestral group of potentialities mentioned above. It is true that the resiniferous vascular strands in the petioles are, in general, in a more primitive phase both in *Haplolobus, Group b* and in *Santiria* § *Trigonochlamys,* but as both of these have disjunct areas, there is apparently no geographical correlation. I would therefore suggest that no sufficient potentialities of *Santiria* § *Eusantiria* reached New Guinea to give rise to or to maintain a representative of that section in the region and that the *Santiria*-like potentialities which did so were more related to *Haplolobus* and just enough to give rise to one single species, viz. *S. lamprocarpa*. The large number of *Haplolobus* endemics in New Guinea would then be a "local species explosion", of the same sort as are found in the Sunda land in other genera. The suggestion, pointed out in a previous paper (lit. 12, pp. 305, 405), that *Haplolobus* started as a genus in New Guinea can therefore not be maintained, although it may be that some of its ancestors migrated westward into the Moluccas. The occurrence of *H. moluccanus* and *H. celebicus* may, however, be also very well explained as a polytopy on the basis of the present distribution of *Santiria apiculata*.

5. GENERAL CONSIDERATIONS ON MALAYSIAN PLANT MIGRATIONS (*map 3*).

Nobody is more competent on this matter than E. D. MERRILL, who during more than 35 years gathered materials towards the historic phytogeography of Malaysia (cf. lit. 20, pp. 77—105 and 127—151). In a recent paper (lit. 21) he has given a concise survey of the main results and problems in this field. Though in many of his papers the results of historic geology have been introduced tentatively, botanical arguments are largely prevailing. I cannot do better than quoting here some parts of the paper cited. The following quotation gives a general idea of early conditions (l.c. p. 249):

”The intermigrations of the early angiosperms in what is now trop-
”ical Asia and Malaysia doubtless took place at a time when the con-
”tinental area extended far to the south, probably in the late Cretaceous
”and early Tertiary, and this is the period when the more widely dis-
”persed Asiatic types, or the ancestors of certain Asiatic types now
”found in New Guinea, extended their ranges. There seems to be little
”or no evidence of direct Asia—New Guinea land connections since the
”early Tertiary.“

”The evidence is that, in later times, there were an eastern and a
”western route of intermigration as between Asia and Malaysia, the
”former from southeastern Asia and Formosa south through the Philip-
”pines at least as far as Celebes, and the latter from India through
”Burma and the Malay Peninsula to Java, Sumatra, and Borneo, with
”apparently a secondary paralleling line through what is now the
”Andaman Islands to Sumatra and perhaps Java. These routes were
”doubtless in operation at a relatively early time, probably in the
”Tertiary, so far as the ancestors of our modern flora were concerned.
”At a later period, particularly from the Pliocene-Pleistocene into
”the Recent, there must have been a very active interchange of plants
”between Asia and western Malaysia, when the Sunda Islands (Java,
”Sumatra, and Borneo) and the Palawan-Calamian group in the Philip-
”pines were at times definitely a part of the Asiatic continent.“

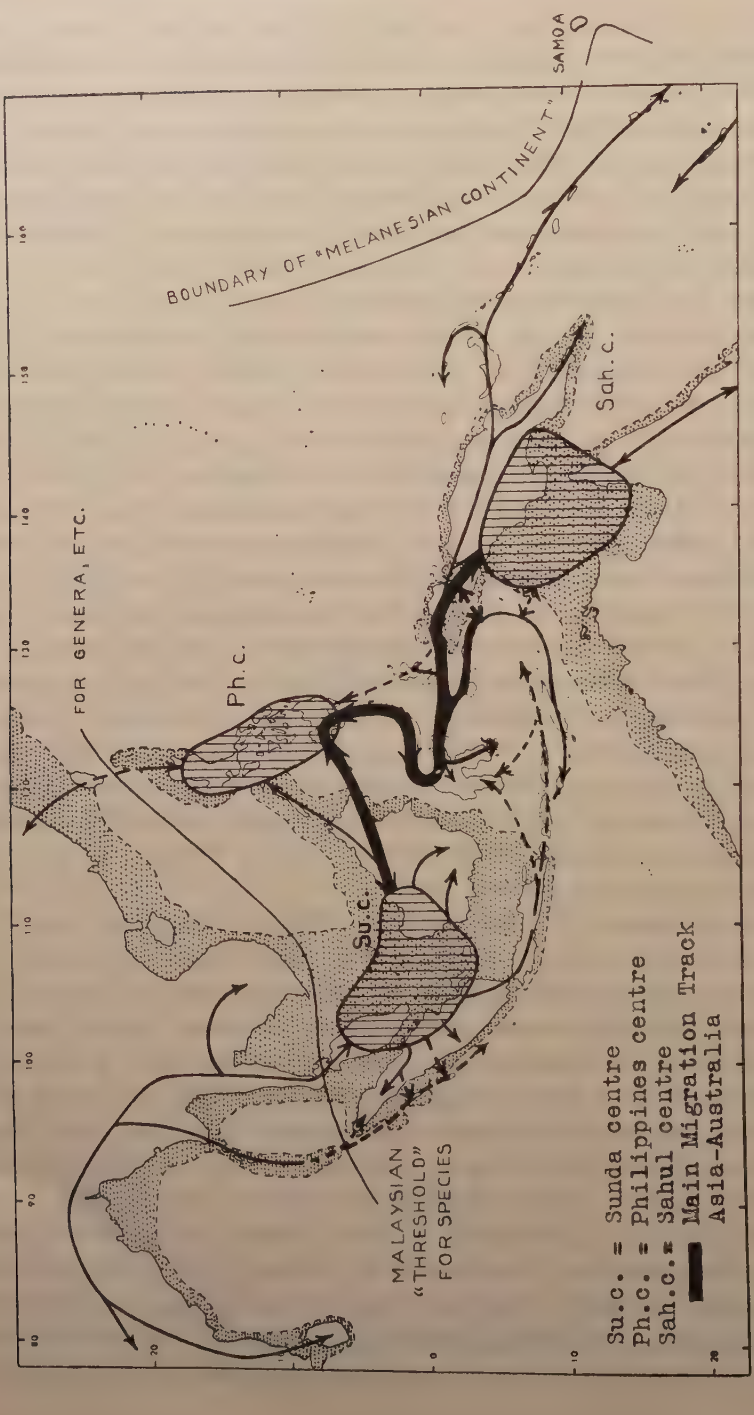
Although climatic conditions have undoubtedly played a certain part, I agree with MERRILL in that their influences were of local rather than of general importance, and that the main ”limiting factor seems ”to be found in the geologic history of Malaysia“ (l.c. p. 251). To which MERRILL adds: ”from the Tertiary, a more or less continuous ”insular area existed in some part of this region, the straits and arms ”of the sea inhibiting the natural dispersal of a great many species ”of plants and animals“.

As is indicated both by biogeographical and by geological arguments, this insular area is particularly what has been called by DICKERSON ”Wallacea“ (lit. 6a, pp. 382—383), viz. the region between WALLACE's and WEBER's Lines. It has been repeatedly pointed out (e.g. MERRILL, lit. 20, pp. 142—143) that the Strait of Macassar has probably not been crossed since the Palaeogene. Western elements occurring East of it, must have reached Celebes either through the North (Philippines—N. Celebes) or through the South (Java—S.W. Celebes) and the first-named connection was apparently the one that was offering the best opportunities. As MERRILL pointed out (lit. 21, p. 254), the unstable portion between the more stable Sunda Land and Sahul Land, possess a flora and a fauna which "are made up in part of relic species and "their descendents, and in part of infiltrations from the west, north "and southeast." The process of increasing isolation of islands in "Wallacea" may have been active both during the greater part of the Tertiary and, on a smaller scale, also since the Pleistocene. If this is true, the supposed regression of *Santiria apiculata* and of the *Haplolobus-Santiria*-ancestors in the Moluccas, would be found confirmed. On account of its probably regression in "Wallacea", its exact migration track can no longer be indicated. The species is still common in many of the Philippine Islands but not known from North Celebes; it is known from Central- and South-Celebes, but not from Java.

Regarding the eastern connections of Celebes, I would draw the attention to the fact that in recent years several cases have come to my knowledge, in which species, thusfar known from eastern islands only, have been collected in Central Celebes, such as: *Gmelina palawensis* H. J. LAM (Palau, Centr. Celebes), *Premna sessilifolia* H. J. LAM (New Guinea, Centr. Celebes), *Canarium acutifolium* (DC.) MERRILL (New Guinea, Kai, Amboina, Ceram, Soela, Centr. Celebes), *C. balsamiferum* WILLD. (Kai, Amboina, Boeroe, Centr. Celebes, North Celebes, Talaud), *C. maluense* LAUTERB. (New Guinea, Centr. Celebes), *C. multijugum* H. J. LAM (Centr. Celebes, Halmahera), *C. oleosum* ENGL. (New Guinea, Kai, Boeroe, Obi, Batjan, Ternate, North Celebes, Timor); *Planchonella moluccana* (BURCK) H. J. LAM (Gebeh, Batjan, Centr. Celebes, Flores), *Palaquium amboinense* BURCK (Kai, Misoöl, Amboina, Soela, North Celebes, several Lesser Sunda Islands). I may add some other cases from other families, which I owe to the kindness of Dr C. G. G. J. VAN STEENIS at Buitenzorg, who called my attention to the following cases: *Grevillea* (Australia, New Guinea, Centr. Celebes), *Macadamia* (Queensland, Centr. Celebes), *Litsea* aff. *calophyllantha* K. SCHUM. (New Guinea, Centr. Celebes), *Tylecarpus papuanus* (BECC.) ENGL. (New Guinea, Kai, Obi, Centr. Celebes), *Neuburgia tubiflora* BL. (= *Couthovia celebica* KOORD.) (New Guinea, Amboina, Centr. Celebes). This is certainly only a small choice of the examples that could be brought together in support to the migration track under discussion. As a matter of course not all of these cases are equally important in regard to phytogeographical conclusions and it must be borne in mind that a thoroughly investigated plot may reveal habitats that later on may appear to allow a quite "normal" explanation. I may, in this connection, mention the rather mysterious areas of *Santiria laevigata* BL. (Sunda Land except Java, Central Celebes) and of *Lucuma malaccensis* (CLARKE) DUBARD (Sapotaceae) with exactly the same area.

Under these conditions the possibility of a relatively recent land connection between Central Celebes eastward must be submitted to the judgment of geologists. With regard to our present problem I would particularly draw the attention to the geologic map of Eastern Malaysia by KUENEN (lit. 10, p. 192, fig. 53 and lit. 11, p. 114, fig. 47) and to the maps of the bottom configuration of the same region by VAN RIEL (l.c., Pl. V and VI). In KUENEN's morphological map there is a connection of Central Celebes through Banggai eastward both with Obi-New Guinea and with Soela-Boeroe-Ceram-Amboina. In VAN RIEL's map the bottom configuration at 2000 metres indicates only the former connection, that at 4000 metres gives also the latter (and New Guinea in addition). The Celebes-Boeroe-Ceram bridge is, by the way, supported by the distribution of *Santiria apiculata* in those parts (Central Celebes, Ceram, Amboina). On a map, published by B. WILLIS (and reproduced by UMBGROVE, lit. 31, fig. 43) the same connection is indicated as a "temporary isthmian connection", only interrupted between Soela and Boeroe (cf. also the geotectonic map of Malaysia by VAN ES, reproduced by KUENEN, lit. 11, fig. 40).

Similar regressive disjunctions as in "Wallacea" are also found in a pretty large number in Western Polynesian types of Asiatic or Malaysian origin. As dissemination through the medium of ocean currents, winds and birds cannot be accepted, for many genera characteristic of Malaysia-Polynesia "one is forced to postulate a different "distribution of land areas at some time in the past, to explain the "present-day distribution of plants and animals. These land areas pro-"bably were of considerable size..." (MERRILL, lit. 21, p. 255). In this connection I have to correct KUENEN (lit. 11, p. 108) inasfar as he says that "The fauna and flora of New Guinea are absolutely and "typically Australian and therefore flatly contradict the hypothesis that "this island is composed of two parts, one Indian and one Australian". The last-named hypothesis was unknown to me and I do not know either wherefrom KUENEN obtained his information, as no botanical publications



Map 3. — Supposed centres of dispersal and migration tracks in Malaysia (see § 5). Dotted areas represent epicontinental seas.

are quoted by him; but it is sufficiently know that New Guinea and even North Queensland and Polynesia have a flora of a predominant Malaysian type (cf. MERRILL, lit. 20, pp. 97—105, and 21, p. 247).

Concluding this paragraph, I am giving a tentative map of centres of origin and of migration-tracks in the region under discusion (*map 3*; cf. also § 6). It is based upon evidence contributed by botanists in the last decennia, and though it is, as far as I can see, not in contradiction with the results of geologic history, it does not suggest land connections in any definite time, except that no older periods are regarded than Tertiary ones. The Sunda centre of origin is undoubtedly more distinct than the two other centres. It is of Tertiary age and has been active during a long time. The Sahul centre is probably younger. Both are of more or less continental nature. The Philippine centre, however, though possibly also pretty old, is different by its continuous insular character. I am inclined to consider it more as a definite centre, particularly for species, than Celebes and the Moluccas, although both groups of islands are forming a part of "Wallacea". The "Malaysian threshold" is introduced to elucidate the remarkable specific endemism [1]) of Malaysia towards the Continent of Asia. It is certainly much younger and of specific importance in its southern part, and older along the China-Formosa-Luzon track and there probably also of generic importance. There is no evidence of such a threshold between Australia and Malaysia. Problematic or weak tracks have been indicated by interrupted lines. In Northeast Australia and in New Caledonia infiltrations of Antarctic types are suggested.

6. GEOLOGICAL EVIDENCE.

As it may be of some use to compile briefly the conclusions geologists have independently arrived at by their own methods, I submitted the general lines of Malaysian phytogeography, as far as land-connections are concerned, to the opinion of Prof. J. H. F. UMBGROVE, Delft, who has for several years been a student of Malaysian geology and who has repeatedly given a survey of the geological history of these parts (lit. 32 and 33, recently recapitulated in 35). I am pleased to tender him my best thanks for his kind cooperation.

As a matter of course, a "palaeoflorist" is a man who does not care much about the theoretical side of geological history, however interesting it may be also for the layman. It does matter very little to him, whether a sea arm has been shallow or deep, except insofar a shallow one is perhaps more liable to turn into a land connection than a deep one. It does not matter to him either whether or not WEGENER's hypothesis of continental drift is to be applied to Malaysia or not (cf. KUENEN, lit. 11, pp. 98—109). The only thing which interests him is: where and in which period did land connections exist?, or rather: how was the relation of land and sea in all former times? The phytogeographer thus asks much more than the geologist can possibly tell him, as large stretches of sea remain terra incognita.

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[1]) Cf. H. N. RIDLEY in Blumea, Suppl. I, 1937, 183.

In the following lines I have endeavoured to give a concise survey of those points of the geologic history of Malaysia, which are of interest for palaeofloristics. The sources were mainly the publications of BADINGS, DICKERSON, KUENEN, VAN RIEL, and UMBGROVE, and the survey was kindly checked by the last-named author. This does, of course, not mean that I take part with or against any investigator or school concerning any structural theory, as a botanist is not competent to do so.

As the primitive Angiosperms probably came into existence during the early or middle Cretaceous and the Burseraceae are certainly not a very primitive order; as furthermore the supposed eastward migration from Tropical America to Tropical Asia must have taken a considerable time, it is probably sufficient to consider, in the present case, geological conditions in East Asia and Polynesia from the end of the Mesozoicum onward.

a. Malaysia as a whole — UMBGROVE (lit. 31) and KUENEN (lit. 11) have published surveys of theories on the origin of Malaysia. The last-named author concludes (l.c., p. 115) that "the Asiatic and the "Australian continents at one time formed a more or less continuous "mass". The greatest land area was probably at the end of Mesozoic and the beginning of Tertiary times. From this period onward there was a clearly increasing extent of the several Palaeogene and Neogene transgressions, until the Pleistocene regressions.

An intensive folding during the Young Miocene in a part of the region probably as far East as Fiji, may have enabled migrations along geanticlines, as far as not submerged (cf. UMBGROVE, lit. 35, fig. 11, p. 38). A younger, Plio-Pleistocene folding affected other parts of the present archipelago (lit. 35, fig. 18, pp. 50—53).

b. Sunda Land — This region was forming a more or less broad peninsula to the East-Asiatic Continent from the Cretaceous through almost the whole of the Tertiary (lit. 35, fig. 5, 8—10, 14). Its size may have been subject to certain changes, but there was probably enough continuous land during the whole period to harbour a rich flora in close contact with that of the continent. It is probable that the land had its greatest extent during the oldest Eocene, and that since then its area diminished more and more on account of proceeding transgressions. For the greater part of the Tertiary, however, parts of Malaya, East Sumatra and West Borneo were part of this peninsula, or at least enough remained of what is now inundated by the Southern part of the South China Sea to enable the floristic recovery of adjacent regions. Only Java may have been apart for long times. There has probably been a connection with the Sunda Land in the Oldest Eocene, maybe another one in the Pliocene (?) and undoubtedly several times connections during the Pleistocene. These conditions are distinctly reflected by the relatively poor Java flora and especially by the fact that generic areas are often connecting the island with other parts of the Sunda Land, while specific areas find either their boundary in the Java Sea and the Sunda Strait or do, in some cases, not extend further eastward than a small Western portion of Java. On account of the last-named fact it is probable that this portion was in a more favourable condition regarding a land connection with the Northwest than the other parts of Java.

The present configuration is very recent, as it is postglacial. During the Pleistocene several transgressions and regressions took place on the Sunda Land; during some of the former, narrow isthmi may have maintained themselves, e.g. between S.E. Sumatra-Bangka-Billiton-Karimata and S.W. Borneo and between S.E. Sumatra and S. Malaya.

c. The Strait of Macassar — The biogeographic conclusion that the Strait of Macassar forms an important floristic demarcation line and that it has existed for a long time, is substantiated by geological evidence. As early as Miocene, or even Eocene, an area of land in the West (Borneo, etc.) was separated from land areas in the east by a shallow sea of much greater extent than that which separates at present Celebes from Borneo (lit. 35, p. 60, figs. 9 and 10).

d. Borneo-Philippines-Celebes — There are at present three rows of islands, two from Borneo to the Philippines (one to Luzon and the other to Mindanao) and one from Mindanao to North-Celebes. A fourth row, though with more gaps, is connecting Mindanao and the Northern Moluccas. As far as the three first connections are concerned, they may have formed land connections during the whole Tertiary, although, of course, not always in the same way (cf. DICKERSON, l.c.).

e. Sunda Land-South Celebes — There is a very slight possibility of a land connection of some Southern part of the Sunda Land with Southwest-Celebes at the end of Mesozoic and the beginning of Tertiary times.

f. Islands West of Sumatra — No definite data are available concerning eventual land connections of these islands, either with Sumatra or with Burma [1]).

g. Java and the Lesser Sunda Islands — No positive data are available concerning possible land connections in this region.

h. Celebes-Moluccas — It is very probable that West-Celebes has had a geologic history that is much different from that of East- and Southeast-Celebes. It is not impossible that Central- and East-Celebes were in connection with Boeroe-Ceram-Tenimbar-Timor (and Ceram possibly with New Guinea) in the Oldest Eocene; another possible connection, though less distinct, may have existed after the Miocene folding of these areas.

i. Philippines (Mindanao)-Northern Moluccas — This connection which is suggested by certain plant areas, can as yet not be confirmed or dated on the basis of geology.

j. Moluccas-New Guinea — Connections in the Oldest Eocene are not improbable, possibly some other connections may have existed after the Miocene folding. The Central Moluccas (Soela, Boeroe, Ceram) are better known concerning this point than the Northern Moluccas (Halmaheira, etc.).

k. New Guinea-North Australia — There has possibly been a connection in the Oldest Eocene, and very probably other ones in the Pleistocene.

l. New Guinea-Melanesia — The Melanesian continent (cf. UMBGROVE, lit. 34, pp. 502—509) shows several subsequent folding systems, the most recent and for our present purpose most important of which being of Miocene age; it affects some groups of islands East of New Guinea, possibly as far East as Fiji. Samoa has never formed a part of this Continent, as it has always been an oceanic island. This confirms our suggestion that both *Garuga* and *Canarium* are probably passively though not intensively dispersed by birds, as the areas of both genera are including Samoa but are, for the rest, congruent with the boundary of the Northern Part of the supposed continent (cf. lit. 12, p. 299, figs. 1—2). Umbgrove considers — in accordance with the opinion of many "Melanesian" geologists — the present conditions in this region as comparable to those in "Wallacea"; the deep sea basins should be of comparatively recent date (Plio-Pleistocene), but parts of the continent may already have become submerged earlier by epicontinental seas.

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[1]) BADINGS (l.c., p. 240, maps II—V) suggests possible land connections between Sumatra and the islands of Nias, Simaloer and Siberoet during the Eocene and the Oligocene. MOLENGRAAFF (De Zeeën van Ned. Indië, 1922, p. 309) says that these islands may have obtained floristic and faunistic elements from Burma through the Andamans and the Nicobars, and from Sumatra. With reference to the last-named connection the Pleistocene regressions are mentioned — H. J. LAM.

In conclusion, it may be said that Asiatic genorheithra, migrating in an eastward direction some time from the Old Tertiary onward, encountered three different regions, viz.

a. the Sunda Land, which was for long times a rich source of new taxonomic units and, consequently, a most important centre of dispersal; it was at the same time a region which enabled rapid migrations.

b. "Wallacea" which, with its continuous insular character and its occasional land connections, formed a serious impediment both to "species explosions" (on account of the relatively small land areas) and to rapid migrations, and which consequently acted as a sieve for potentialities. Such genorheithra as succeeded in passing through this sieve were either rapid migrators (sea currents, winds, animals; e.g. *Canarium, Garuga*) or "lucky" ones (*Haplolobus*). The representatives of the last-named category did probably, as a rule, not enter it, far less did they emerge, without being more or less damaged in regard to their genetic property. Some of them must have retained too little of this property to maintain themselves; consequently, they have already disappeared or are still in regression (*Santiria, Dacryodes*). Others arrived in the second continental area,

c. the Sahul Land, with enough genetic property, to be able to produce a (new) "species explosion". However, the Sahul Land is smaller and of much more recent date than the Sunda Land; moreover, large parts of the adjacent "Melanesian Continent" have disappeared. These conditions, together with the fact that Australia is partly extratropic, may be responsible for the circumstance that the Australian types that have reached Asia are considerably fewer than the Asiatic types that have reached Australia and Polynesia; for the difficulties encoun-

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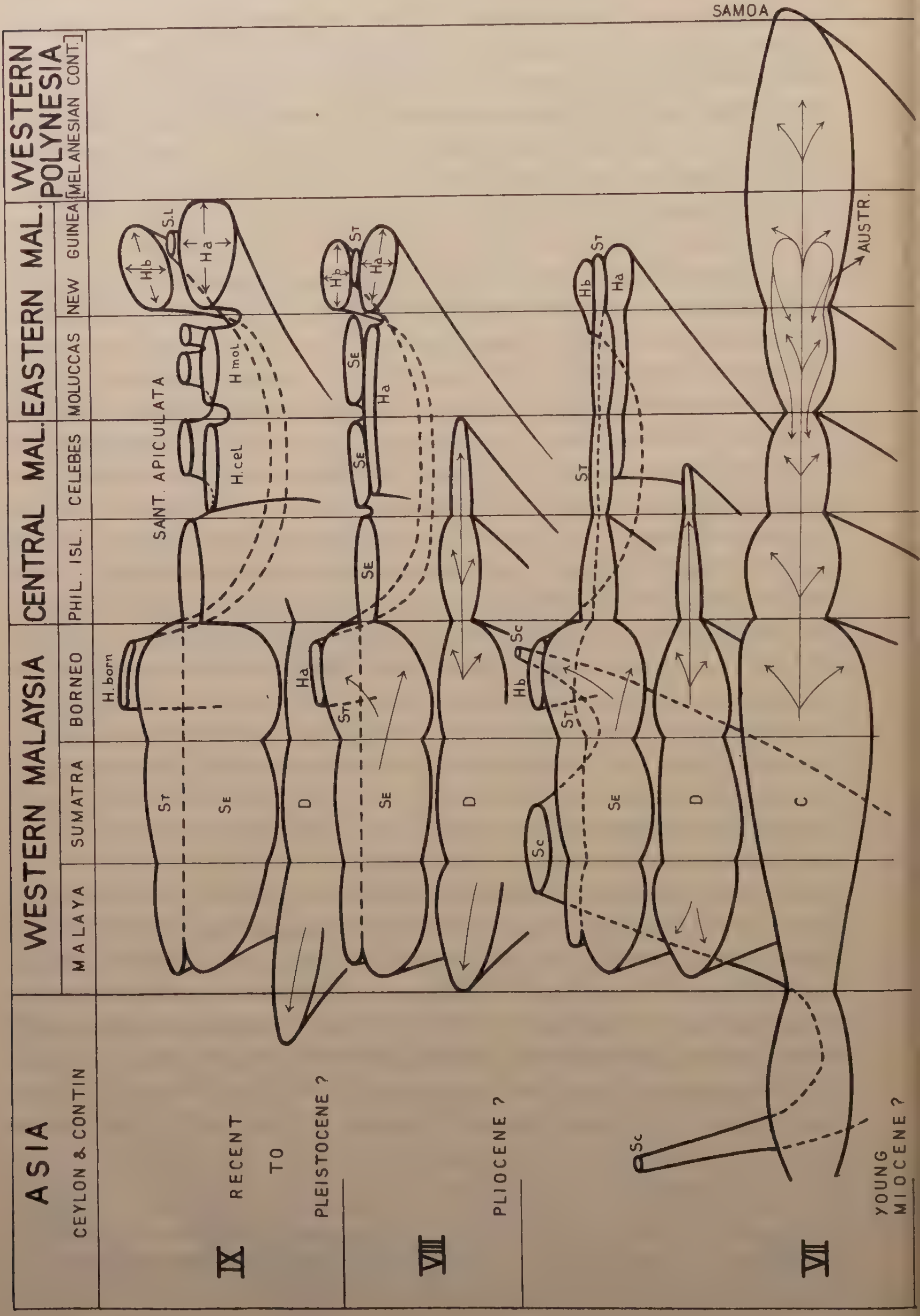
Legenda to fig. 1.

C. Canarium; G. Garuga; P. Protium; Sc. Scutinanthe; D. Dacryodes; S. Santiria; Se. Santiria, sect. Eusantiria; St. Santiria, sect. Trigonochlamys; Ha. Haplolobus, group a; Hb. Haplolobus, group b; S. l. Santiria lamprocarpa.


ASIA
CEYLON & CONTIN
WESTERN MALAYSIA
MALAYA
SUMATRA
BORNEO
CENTRAL MAL.
PHIL. ISL.
CELEBES
EASTERN MAL.
MOLUCCAS
NEW GUINEA
WESTERN POLYNESIA
[MELANESIAN CONT.]
SAMOA
AUSTR.
IX
RECENT TO PLEISTOCENE ?
VIII
PLIOCENE ?
VII
YOUNG MIOCENE ?
SANT. APICULATA
H.born
H.cel
H mol.
S.l
Hb
Ha
St
Se
D
C
Sc

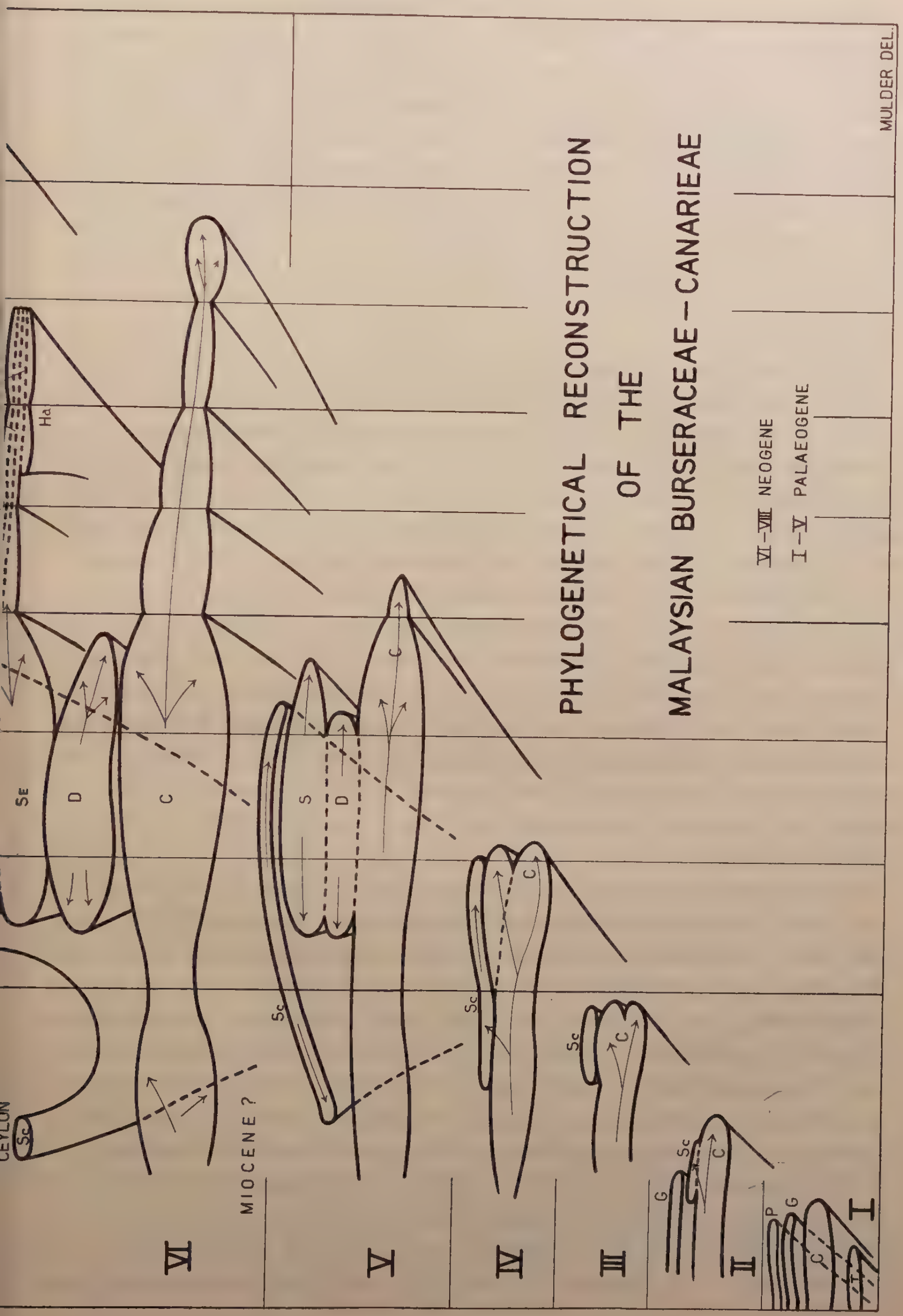

PHYLOGENETICAL RECONSTRUCTION
OF THE
MALAYSIAN BURSERACEAE—CANARIEAE
VI–VIII NEOGENE
I–V PALAEOGENE
MULDER DEL.
VI
V
IV
III
II
I
MIOCENE ?
CEYLON
Sc
Se
Ha
D
C
S
G
P

Fig. 1.

tered during the westward migration of the former are of the same nature as those described above for Asiatic types migrating eastward.

The main migration track through "Wallacea" may have been the one that is indicated on *map 3*, running from the Sunda Land through the Sulu- and Sangihe-connections (the Palawan connection was interrupted for long times between Mindoro and Luzon), through North- and Central-Celebes-Soela-Obi (or -Boeroe-Ceram?) and New Guinea to Australia (and Polynesia).

7. CONCLUSIONS (*fig. 1*).

I am now coming to my conclusion which I will illustrate by a three-dimensional scheme of the supposed phylogeny of the Malaysian Canarieae. This scheme is of the same sort as that concerning a part of the Sapotaceae (lit. 15, p. 111) and is based upon the same principles as the tables I, II and V given above, namely in that the upper plane of the figures is meant to represent three items, viz. the Time Level, the estimated relative diversity of taxonomic units and their areas:

I. *Eocene?* — An ancestral group C (comprising the potentialities for all recent East Asiatic, Malaysian and Polynesian Canarieae) and an ancestral group G (representing the ancestors of *Garuga* [Protieae]) are migrating eastward in Southern Asia together with a group P (the ancestors of the Eastern *Protium* species) and a group T (Bursereae; the ancestors of *Triomma*). Especially G (+ P) and C were probably pretty closely related, with free pyrenes and 5—3-merous flowers and a tendency to form a receptacle in G and towards meiomery and connate pyrenes in C.

II. From this phase onwards the groups T and P have been left out. The eastward migration of both groups proceeds. G, being an old group with few potentialities left, is not able to display a large diversity, but the much greater number of potentialities of C enables that group to differentiate. Its first differentiation is the separation into a "*Proscutinanthe*" group Sc, in which some *Garuga*-like potentialities (5-merous flowers, primordial receptacle, free pyrenes with a tendency to connation) are incorporated, and a "*Procanarium*" group C which comprises the potentialities of the recent 3-merous Canarieae. It is not necessary to accept that this group was already fully 3-merous. The occasional pleiomery in recent *Canarium* species (cf. lit. 13 and 17) suggests that the old "*Procanarium*" may have had variable (5—) 4—3-merous flowers. In group C there was a slight tendency left to form a receptacle but a strong tendency to meiomery and to connation of the pyrenes.

III. From this phase onward the group G, from which the Procanarieae are strongly diverging, has been left out. As has been mentioned above, *Garuga* at present covers almost the same area as *Canarium*. There are now two "genera", viz. "*Proscutinanthe*" Sc with 5-merous flowers, a primordial receptacle and a tendency towards connate pyrenes, and "*Procanarium*" C. The latter is going to differentiate into a group in which an axial intrusion is to be developed (the future *Canarium*) and a group in which such an intrusion is not found (the future *Dacryodiinae*).

IV. In this phase the Sunda Land is reached by both groups. The diversity and the divergence of C are rapidly increasing, the diversity of G not, as far as we know [1]).

V. The Sunda Land is crossed and *Scutinanthe*, which is now a fully independent genus, has reached Borneo, covering an area from India to Borneo. The 3-merous *Procanarium* is further splitting up into three more or less distinct groups, viz. *Procanarium* C, *Prodacryodes* D and *Prosantiria* S. Of these C is migrating with the greater speed and has already crossed the Eastern boundary of Sunda Land (probably particularly through the Borneo-Philippines connection), S is proceeding in the same way though more slowly and D is slowest. But all three are increasing in diversity.

VI. *Miocene?* — *Scutinanthe* Sc has passed its optimum (regression by lack of potentialities?). Its area becomes disjunct. C, D and S, however, are still rapidly increasing their diversities and their areas, D and S particularly in the Sunda Land, *Canarium* in almost every separate floristic region. The last-named genus is now fully independent. *Santiria* shows a further differentiation into two groups viz. *Eusantiria* SE (older) and *Trigonochlamys* ST (younger). Both are migrating eastward, however, with relatively few potentialities. Almost simultaneously the primitive *Haplolobus* ancestors are beginning to differentiate, group a from SE in Celebes and the Moluccas, group b from ST from Borneo eastward to the Moluccas. Both *Canarium* and

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[1]) As a matter of course, of genera like *Scutinanthe* and *Garuga*, of which only one or a few recent species and no fossil remainders are known, a phylogenetical scheme is still more speculative than in other cases, as rapid and short-lasting increases and decreases of diversities may have existed without leaving any traces. From a theoretical point of view, however, such events are not very probable and we may accept the interpretation given above as the more probable one.

Santiria are migrating eastward into the Philippines, Celebes and the Moluccas, and *Canarium*, as the more rapid migrator, has reached New Guinea.

VII. *Young Miocene or Pliocene?* — The regression of *Scutinanthe* Sc is proceeding; it has disappeared from India and becomes rare in Ceylon and Borneo. Of the other genera not only *Canarium* but also *Dacryodes* and *Santiria* are independent now. In which way this may have been accomplished may be taken from Table III. All genera are still increasing in diversity. *Canarium* is rapidly proceeding into the Melanesian Continent or its remainders. Some of its Papuan products are migrating backwards into the Moluccas and Celebes. *Dacryodes* has proceeded as far as Celebes. *Santiria* has reached New Guinea but only the *Haplolobus*-potentialities were apparently numerous enough to maintain and to diversify the species there. Its group a was still connected with the Moluccas; group b however, became disjunct as its representatives in the Moluccas and Celebes (and the Philippines?) either never were materialized from their potentialities or disappeared. Se did probably not reach New Guinea at all or could not maintain itself. St, however, did and is still represented by a single species.

VIII. *Pliocene?* — From this phase onward *Scutinanthe* and *Canarium* have been left out. *Dacryodes* has still more proceeded into Celebes. *Santiria*, however, could increase its diversity only in the Sunda Land. As far as *Haplolobus* is concerned, this genus is not yet fully independent taxonomically, but its area is already in regression in the Moluccas and in both group a and group b. In New Guinea, however, both groups are increasing their diversity.

IX. This symbolizes the period from the *Pleistocene* onward. *Dacryodes*, of which only the western part of the area has been drawn, has passed the Malaysian Threshold in a westward migration through which it has reached Cochin China. *D. rostrata* is the only species of the Malaysian section *Curtisina* that is known from outside Malaysia. It is not known whether its area is continuous through the isthmus of Kra. The above interpretation is, of course, not the only possible one. Another one is that the species originated more towards the continent, in which case the species must be a relatively old one. Finally also bitopy could be suggested as an explanation. *D. rugosa* has probably reached West-Java during one of the Pleistocene regressions. *Haplolobus* is fully independent and the area of both groups is still more disjunct than in VIII. Both, however, are strongly increasing their diversity in New Guinea and it may be expected that some of these will migrate westward (as some *Canarium* species did in an earlier phase, cf. VII) as soon as a land connection gives them the opportunity to do so. Of St only one species is left in New Guinea (*S. lamprocarpa*); the others are restricted to Borneo and apparently still increasing in diversity there. The only recent representative of Se East of Celebes, viz. *S. apiculata*, is also in regression in the eastern part of its area, as is indicated by its rarity in those parts. The Burseraceae of North Queensland (1 *Protium*, 1 *Garuga* and 2 *Canarium* species) probably reached the Australian Continent during the Pleistocene regressions.

It hardly needs to be said that the indications of the geological periods are arbitrary to a high degree (especially in regard to *Scutinanthe*). The only periods for which some probability could be accepted in connection with migration, are the Early Eocene, the Young Miocene and the Pleistocene. Perhaps only a few of the youngest endemics might be of postglacial age.

Literature cited.

1. BAAS BECKING, L. G. M., Gaia of Leven en Aarde — Rede Leiden, 1931.
2. ——, Geobiologie — W. P. van Stockum & Zoon N.V., Den Haag, 1934.
3. BADINGS, H. H., Het Palaeogeen in den Indischen Archipel — Verhand. Geol.-Mijnbouwk. Gen. Ned. en Kol., Geol. Ser. Vol. XI, nr. 3, 1936, 233—292 and Vol. XII, nr. 1, 1937, 41—42 (Errata).
4. DANSER, B. H., Ueber die Niederl. Indischen Stachytarpheta-Arten, etc. — Ann. du Jard. bot. de Buitenzorg 40, 1929, 1—43.
5. ——, Ueber die Begriffe Komparium, Kommiskuum und Konvivium, etc. — Genetica 11, 1929, 399—450.
6. DICKERSON, R. E., Tertiary Palaeogeography of the Philippines — Phil. Journ. Sci. 25, 1924, 1—50.

6a. ——, Geologic aspects of Philippine Hydrography — Handel. 3e Ned. Ind. Nat. wet. Congr. 1924, 381—408.

7. GILMOUR, J. S. L., A taxonomic problem — Nature 19 June 1937, 1040—1042.
8. KAUFFMANN, R., Exakt nachgewiesene Stammesgeschichte — Die Naturwissenschaften 48, 1934, 803—807.
9. KERNER, A., Die Abhängigkeit der Pflanzengestalt von Klima und Boden etc. — Festschr. 43. Vers. D. Naturf. u. Aerzte in Innsbruck 1869.
10. KUENEN, PH. H., Relations between submarine Topography and Gravity Field — Gravity Exped. at sea 1923—1932, Vol. II, Publ. of the Neth. Geodetic Comm., 1934, 183—194.
11. ——, Geological interpretation of bathymetrical results — The Snellius Expedition, Vol. V, Part. 1, 1935.
12. LAM, H. J., The Burseraceae of the Malay Archipelago and Peninsula — Bull. du Jard. bot. de Buitenzorg, Sér. III, Vol. XII, 1932, 281—561.

13. Lam, H. J., Beiträge zur Morphologie der Burseraceae, insbesondere der Canarieae I — Ann. Jard. bot. Buitenz. **42**, 1932, 23—56.
14. ——, Idem II, l.c. 97—220.
15. ——, Phylogeny of Single Features — Gardens' Bull. Straits Settlem, **9**, Part. 1, 1935, 98—112.
16. ——, On Phylogenetic Symbols, Past and Present — Acta Biotheoretica **2**, Pars 3, 1936, 153—194.
17. —— (with W. C. van Heurn), On fertility, pleiomery and meiomery in the fruits of some Canarium species — Blumea, Suppl. I, 1937, 97—106.
18. ——, Monograph of the genus Nesoluma (Sapotaceae). A primitive Polynesian Endemic of supposed antarctic origin — B. P. Bishop Mus. Honolulu, Occas. Pap. 1938 (under the press).
19. Lütjeharms, W. J., Substanzbegriff und Systematik — Blumea **1**, 1934, 160—193.
20. Merrill, E. D., An Enumeration of Philippine Flowering Plants, Vol. **4**, 1926.
21. ——, Malaysian Phytogeography in relation to the Polynesian Flora — Essays in Geobot. in Hon. of W. A. Setchell, Univ. of Calif. Press 1936, 247—261.
22. Palmgren, A., Ueber Artenzahl und Areal, etc. — Acta Forest. Fennica **22**, 1922, 1—136.
23. ——, Chance as an element in plant geography — Proc. Congr. Plant Sci. Ithaca 1926, 591—602 (cf. also literature quoted in this paper).
24. Ridley, H. N., The dispersal of plants throughout the world, 1930.
25. Riel, P. M. van, The bottom configuration in relation to the flow of the bottom water — The Snellius Expedition, Vol. II, Part 2, Chapt. II, 1934.
26. Sinia, H. R., Zur Phylogenie der Fiederblätter der Burseraceen und verwandter Familien — Ann. Jard. bot. Buitenzorg **48**, 1938, 69—101.
27. Smith, Lyman B., Geographical evidence on the lines of evolution in the Bromeliaceae — Engl. Bot. Jahrb. **66**, 4, 1934, 446—468.
28. Tan Sin Hok, Zur Kenntnis der Miogypsiniden — De Ingenieur in Ned. Indië IV, 1936, 45—61, 84—98 and 109—123 (especially pp. 96—98 and 109—120).
29. ——, Zur Kenntnis der Lepidocycliniden — Natuurk. Tijdschr. v. Ned. Indië **96**, 1936, 235—280 (esp. pp. 263—276).
30. Umbgrove, J. H. F., The Relation between Geology and Gravity Field in the East Indian Archipelago — Gravity Exped. at sea 1923—1932, Vol. II, Publ. of the Neth. Geodetic Comm. 1934, 140—161, Plate III.
31. ——, A short Survey of Theories on the origin of the East Indian Archipelago — ibidem 1934, 163—182.
32. ——, Het Neogeen in den Indischen Archipel — Tijdschr. Kon. Ned. Aardrijksk. Gen., 2e Ser., **49**, 1932, 769—833.
33. ——, De pretertiaire historie van den Indischen Archipel — Leidsche Geol. Meded. **7**, 1935, 119—155.
34. ——, Palaeografie der Oceanen — Tijdschr. Kon. Ned. Aardr. Gen. **54**, 4, 1937, p. 489—533, with English Summary.
35. ——, Geological History of the East Indies — Bull. Am. Petr. Geologists **22**, 1938, p. 1—70. This paper resumes and revises the views laid down in lit. 3, 32 and 33.
36. Willis, J. C., Age and Area — Cambridge 1932.

ON A NEW CHIONACHNE FROM QUEENSLAND

by

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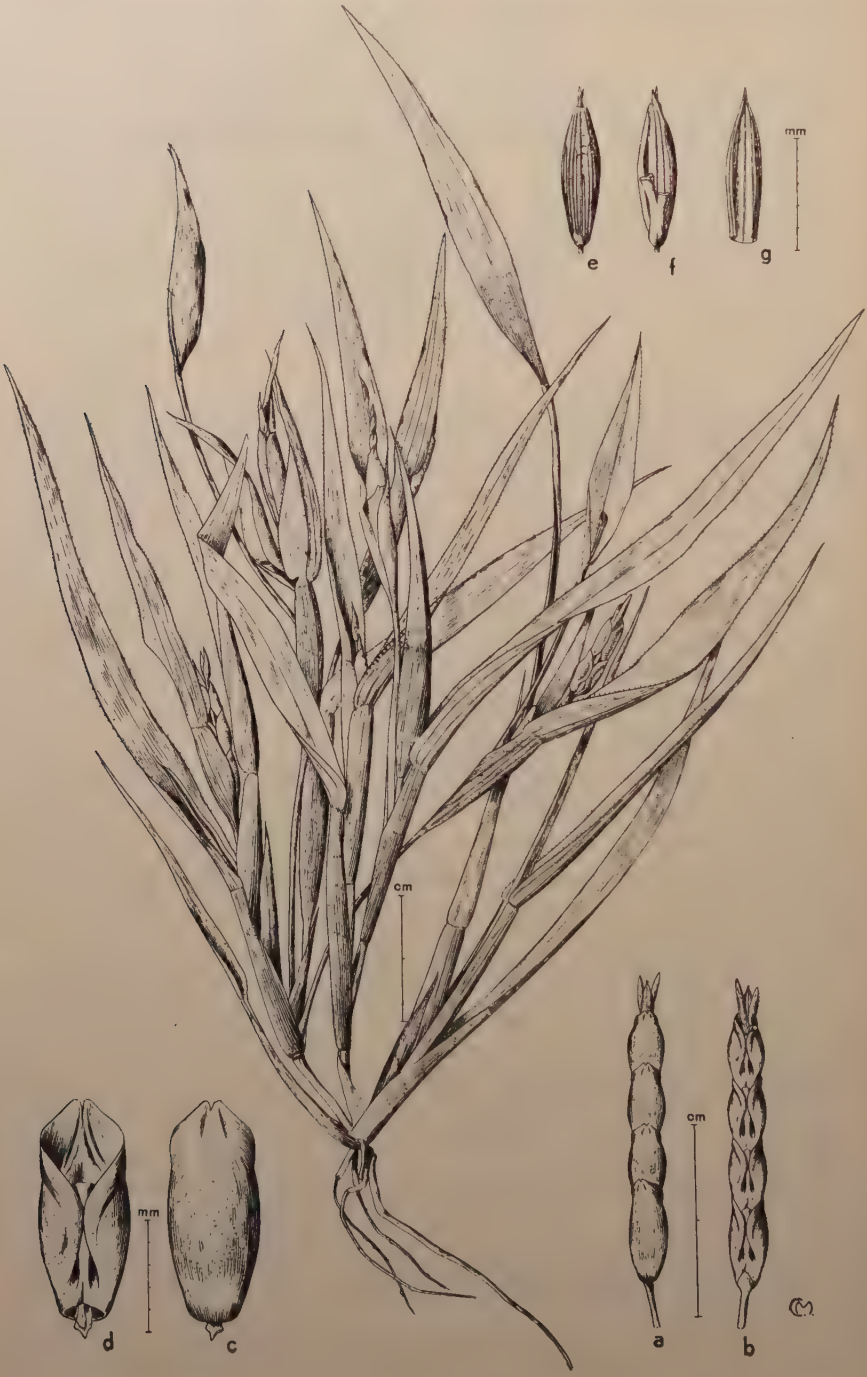
(Issued May 2nd, 1938).

Years ago I intensively studied the grasses of the tribe of the *Maydeae*. The results of my investigations were published in an article "A contribution to the knowledge of the Indian Maydeae", issued in the "Mededeelingen van 's Rijks Herbarium" no. 67 (1931). In this paper the grasses of this tribe from the Old World were treated and especially the various genera were characterized according to their caryopses. The curious form and the place of the hilum of the caryopsis were accepted as characters of high importance to distinguish and to establish the various genera, and it was especially the genus *Polytoca,* which was more sharply defined by the place of the hilum, the lower margins of the grain enclosing a cavity at the bottom of which is found the hilum. In the genus *Chionachne* such a cavity is not present and the hilum is found at the back of the grain. I accepted 4 species of the genus *Chionachne.* One of them, viz. *Ch. Koenigii* (SPRENGEL) THWAITES, is rather widely distributed from British India and Ceylon to Tonkin and from Celebes to Queensland.

Ch. biaurita HACKEL is endemic in the Philippines and *Ch. semiteres* (BENTH.) HENR. was only observed in the Deccan Peninsula and Burma. The fourth species was mentioned by me from Queensland as being *Chionachne Sclerachne* BAILEY. The type of BAILEY was not represented in the Kew Herbarium and I saw only a fragment from a plant collected by F. v. MUELLER, which I accepted as being BAILEY's species. DOMIN mentioned from Queensland only *Polytoca cyathopoda* (F. v. M.) BAILEY and not having seen DOMIN's plant I had only to accept that the identification was correct. Recently Mr. HUBBARD from the Kew Herbarium could examine DOMIN's plant and found that it belonged to the genus *Chionachne.*

My ideas on *Chionachne Sclerachne* BAILEY were only based upon


mm
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the single plant, mentioned in my paper. Now the species *Chionachne Sclerachne* was originally described from material collected by Gulliver at Lloyd Bay, and the type specimen is in the Brisbane Herbarium; it consists of a few small pieces of culm and some cleistogamous spikelets. Hubbard, who inspected this type, says about it that the material proved insufficient to give Bailey a clear idea of the species, a species he later transferred to the genus *Polytoca*. *Chionachne* is, however, readily distinguished by the unisexual spikelets of quite a different structure. Hubbard further observed that still later Bailey referred complete plants of his species collected by Bick on Badu Island to *Panicum marginatum* var. *strictum* Benth., failing to connect them with his *Chionachne Sclerachne*. Bick's specimens have chasmogamous and cleistogamous spikelets, the latter agree with those of Gulliver's plant, the type of Bailey.

The identity of Bailey's *Chionachne Sclerachne* now being established, it is evident that Bailey's species is no longer a member of the tribe of the *Maydeae* but belongs to the *Paniceae*. Hubbard accepts it as belonging to a distinct genus, the genus *Cleistochloa*, described by him in Hooker's Icones Plantarum, Vol. III (Fifth series) Tab. 3209. This genus *Cleistochloa* contains two species. One is *Chionachne Sclerachne* Bailey, which of course now has to bear the name of *Cleistochloa Sclerachne* (Bailey) Hubbard. The other species was described by Domin as *Panicum subjunceum* in the year 1915, a name which cannot be accepted on account of Ekman's *Panicum subjunceum* from South America, a distinct species of *Panicum*. Hubbard applies to the species of Domin the name of *Cleistochloa subjuncea* (Dom.) Hubbard which is not correct, according to our rules of nomenclature, because *Panicum subjunceum* Ekman antedates Domin's name.

I therefore propose to rename *Cleistochloa subjuncea* of Hubbard, giving it the name of **Cleistochloa Hubbardiana** Henrard, nom. nov. It is a pity that well-established names ought to be rejected on reasons given above. We have the same as to the well-known *Pennisetum dichotomum* (Forsk.) Delile, based upon *Panicum dichotomum* Forskal. (1775). There is, however, a *Panicum dichotomum* L. (1753). Hence Delile's combination it not tenable. *Panicum divisum* Gmelin (1791)

Chionachne Hubbardiana Henr. Whole plant; a, inflorescence dorsal side; b, the same, ventral side; c, female fruit-case dorsally seen; d, the same ventral side; e, male spikelet from the back; f, the same, ventral side with the rhachis; g, upper glume.

is the next name for this species which becomes thus **Pennisetum divisum** (GMELIN) HENR., nov. comb.

HUBBARD observed in his paper on *Cleistochloa* that I identified with *Chionachne Sclerachne* BAILEY a specimen collected at Sturts Creek in North-West Australia by MUELLER, but that now this plant of MUELLER represents a new species of *Chionachne*.

A short description was given by me in my paper on p. 15 which description only applies to the fruit-cases of the plant collected by MUELLER. Only a few other notes were given on p. 17. The fruit-cases of the new *Chionachne* were figured on Plate IV, fig. 3. Of course it would have been sufficient to give a new name to the plant, basing this name on the formerly given short description and the plate, but I preferred to give a detailed description of the new species. Correspondence with Mr C. E. HUBBARD gave me valuable information on this subject, because recently there was received more material and I have had the privilege to study it. I am much indebted to Mr HUBBARD for his notes and to the director of the Kew Herbarium for the loan of the specimens.

Before I am giving an extensive description of the new species I will memorate that Mr HUBBARD himself did not collect the species during his travels in Queensland, but he studied the new species in the Kew Herbarium, in the Herbarium of DOMIN (Prague) and in the Brisbane Herbarium. He allowed me to publish the notes on its distribution. Furthermore he found that DOMIN's *Polytoca cyathopoda* BAILEY was not a *Polytoca* but belonged to our new species.

The distribution of all the specimens hitherto known is given at the end of my description.

Chionachne Hubbardiana HENRARD nov. spec. — Annua, erecta, jam a basi et superne e nodis fere omnibus ramosa. Culmi angulosi, valde sulcati vel subcompresso-carinati, angulis scabris, inferne sublaevi, praesertim superne tuberculis mammillosis characteristicis, pilis hyalinis instructis, praediti. Nodi adpresse sed longiter pilosi. Vaginae compressae, firmae, multinervosae, carinatae vel subrotundatae, inter nervos tuberculis praeditae; laminae subtus carinatae, ad 1 cm. latae, glaucae, multinervosae, marginibus cartilagineis spinosissimis praeditae, sensim acuminatae, subpungentes, apice leviter involutae, ad 20 cm vel plus longae, vulgo breviores, a basi distincte cordatae, lateraliter auriculatae, ligula albo-scariosa vel lacerata, vix 2 mm longa, glaberrima, apice subciliata. Rami e nodis fere omnibus floriferi, pedunculi elegantes pro maxime parte ut inflorescentia a folio ultimo circumdati; penduculus leviter striatus, subtilissime scaberulus, apice cupulatus et

ibi cum inflorescentia articulatim connatus. Prophyllum multinervosum, venis anastomosantibus, hyalinum, marginibus latis puberulis haud incrassatis. Inflorescentia articulata, inferne articulis foemineis vulgo 5—6 formata, superne masculina. Rhachis elegans, articulata, fragilissima, internodia in maturitatem circa 5 mm longa, pars visibilis applanata a basi gluma ossea connata, sed et inferne et superne bene visibilis; spiculae biflorae, flos superior valde reducta vel interdum fere nulla, gluma inferior floris inferioris valde aucta et indurata, vulgo 9 mm longa, 4 mm lata, apice distincte emarginata vel bifida, basi constricta, superne flabellatim expansa, marginibus rotundatis sese tegentibus, toto superficie granulato-rugosa, obsolete multinervosa, superne sub apice viridi-binervosa nervis secundariis obsoletis praedita; gluma superior totaliter inclusa, superne rostrato-acuminata, dorso subplana vel nervo mediano carinata, glabra, subnitens, lateraliter rotundata, involuta, multinervosa, nervis anastomosantibus, gluma tertia et quarta ut in secunda sed magis hyalina; flos superior valde reducta; fructus ephippiformis, 3 mm longa, 2.5 mm lata, leviter apiculata, hilum areolatum, brunneo-nigrescens, longitudinaliter lineolatum, bene visibile. Inflorescentia masculina spiciformis, vulgo e spiculis 3—4 angustis, 7 mm longis composita, spiculae biflorae, gluma inferior viridi-albescens, circa 11-nervia, nervis superne anastomosantibus, superne acuminata sed leviter subemarginata, subcarinata, superne compressa, minutissime ciliolata, gluma secunda ut gl. I. sed magis hyalina, glumae fertiles et paleae hyalinae, paucinerviae; stamina 3, antherae in statu sicco 2 mm longae, flos superior masculina etiam staminibus 3 praedita, glumae omniae hyalinae.

Queensland: endemic.

Localities: Clare Valley, Richmond: F. L. Berney 40, locally known as "Wild Sorghum" (Hb. Kew!, Hb. Brisbane) — Julia Creek, May 1914: A. Gibson (Hb. Kew) — Leichhardt River, flooded tracts, 3 ft. high (Hb. Brisb.) — Logan Downs, Clermont, March 1927: G. A. Fairbairn (Hb. Brisb.) — Hughenden, apud montem Mount Walker, March 1910: Domin (Hb. propr.) — Rolling Downs, in locis graminosis, March 1910: Domin (Hb. propr.).

Sturts Creek: F. von Mueller, *type*! (Hb. Kew); H. Gregory (Hb. Kew!).

Darling Downs, cultivated in experimental plots on property of Dr E. Hirschfeld, Inglewood, 20. 1. 1934: C. T. White 9745 (Hb. Kew!).

ON THE GEOGRAPHICAL DISTRIBUTION OF THE GENUS ACRACHNE

by

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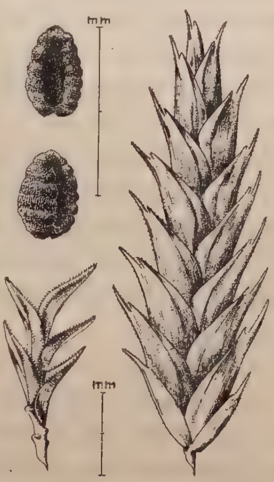
(National Herbarium, Leiden).

ROXBURGH described in his Flora in the year 1820 a very curious annual grass and placed it in the genus *Eleusine* as *E. verticillata* ROXB.. This grass has spikelets which agree in many characters with those of the genus *Eleusine,* especially as to the rugose grain with a caducous pericarp, but differing from *Eleusine* in the up to 20-flowered spikelets and in the lemmas with a three-cuspidate summit. The many-flowered spikelets give the plant more the habit of an *Eragrostis* and under this genus a specimen was mentioned by WALLICH in his Catalogue. There are in the characters of the spikelets many other differences with the genus *Eleusine* and with *Eragrostis.* KUNTH and STEUDEL indeed placed the plant under *Leptochloa* and there are still other opinions about this plant.

An advancement in this matter was the opinion of LINDLEY, who published in the year 1836 a new genus *Acrachne* WIGHT et ARN., in the second edition of his "Natural System of Botany", p. 381, based upon ROXBURGH's *Eleusine verticillata.* The name *Acrachne* was already given by WIGHT et ARNOTT as *Acrachne eleusinoides,* a nomen in WIGHT, Cat. no. 1760. This name was placed by STEUDEL in the year 1854 under *E. verticillata* ROXB., a name also accepted by NEES. The name *Acrachne,* although based upon a species which was validly published, was, however, not described by LINDLEY and the combination *A. verticillata* was not made by LINDLEY. At that time the genus *Acrachne* was therefore not valid.

It was, however, a very happy thought of CHIOVENDA to recognize our plant as belonging to a very distinct genus. CHIOVENDA had reasons to study this plant; although described by ROXBURGH from British India, it occurs in North-eastern Africa too.

In Pirotta's "Flora della Colonia Eritrea“ (Annuari del reale Instituto botanico di Roma, Anno VIII, 1898—1899), Chiovenda gave on p. 361 a very good description of the genus *Acrachne* Wight et Arn.. He too based the genus on Roxburgh's *Eleusine verticillata* and published the combination *Acrachne verticillata* (Roxb.) Lindley, although Lindley did not publish this combination himself. At the same time Chiovenda gave some important data: "Genere che si stacca nettamente da *Eleusine* ”ove fu collocato da parecchi autori per le ”glume sterili caducissime 1-nerve, per le ”fertili mucronato-aristate all'apice e coi due ”nervi laterali sporgenti e formanti due dentolini acuti ai lati dell'aresta. Per il carnattere della cariosside è assai prossimo al ”genere *Dactyloctenium,* mentre per i caratteri delle glume è prossimo specialmente al ”genere *Triraphis.* Alla maturità cadono le ”glume sterili e fiorifere e le carossidi lasciando sulla rachide le palee come avviene nel ”Gen. *Eragrostis* sect. *Pteroessa.*“



Acrachne verticillata (Roxb.) Lindl. Mature spikelet, rachis with persistant paleae and grains without the pericarp.

Although the racemes are quite sessile, bearing unilateral spikelets over its whole length as in the tribe of the *Chloridae,* Chiovenda placed the genus *Acrachne* in the tribe of the *Festuceae.* I have formerly already given my critical observations on the tribe of the *Chlorideae,* noting that it is in its present state very unnatural (Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich, LXXIV, 1929, p. 130).

In recent times this tribe of the *Chlorideae* is more and more purified by eliminating those aberrant genera. By using only the characters of the inflorescence, *Acrachne* is to be accepted as a member of the *Chlorideae,* but this is certainly not a natural classification. Similar conditions occur in other genera, as, for instance, in *Digitaria.* The inflorescence of the genus *Leptoloma* is certainly very different from that of the common members of the genus *Digitaria,* but going over the whole genus, there are so many intermediate forms of the panicle, gradually passing from the effuse panicle of *Leptoloma* to the strictly digitate racemes in various species of *Digitaria* that it is quite unnatural to maintain *Leptoloma* as a genus. The fruits of the latter are undistinguishable from those of the common members of the genus

Digitaria. Of course, when such differences of characters in the panicle are supported by important differences in the floral-characters or in the fruits, we are justified to make discriminations.

Now going over such tribes as the *Chlorideae* and the *Festuceae* we find easily that floral characters are often not in accordance with other important differences and therefore STAPF's classification in "Flora Capensis" VII, 1897, p. 316 is more satisfying. He established a new tribe, the *Eragrostideae*, a tribe with 3-nerved flowering glumes and he brings into this tribe some genera formerly inserted under the *Festuceae*, e.g. *Diplachne* and *Eragrostis.*

Still further goes HUBBARD, who in HUTCHINSON's "Families of Flowering Plants" II, 1934, p. 210 transferred other genera of the *Chlorideae* and the *Festuceae* to the tribe of the *Eragrostideae.*

This method has an enormous advantage, the purifying of the tribes comes into accordance with geographical questions because the restricted tribe of the *Festuceae* now occurs only in the temperate regions of the world, while the *Eragrostideae* and the *Chlorideae* constitute a tropical group.

Recently the system of the grasses is treated by HENRI PRAT in the "Annales des Sciences naturelles", Sér. X, Botanique, Tom. XVIII, 1936, p. 165—258. He does not wish to give a new system but only a treatment or a general synthesis of all the facts hitherto known concerning the *Gramineae.* We can but underline his words that: "toutes les classifi- "cations des Graminées devront être regardées comme incomplètes et "provisoires, exposées à être démenties à bref délai par un nouveau "travail partiel".

HUBBARD accepts 38 genera in the tribe of the *Eragrostideae* (Cf. HOOKER's Icones Plantarum Sér. V, Vol. IV, 1936, Tab. 3319, p. 3, where a key to the genera is given). *Acrachne* is accepted as a monotypic genus, and placed next to *Eleusine,* the latter is thus transferred to the *Eragrostideae* too. The distribution of this genus is given as Tropical Africa and Asia, and Northern Australia. Being recorded from Abyssinia and Eritrea, British India and Tonkin and from Australia, there are large gaps in this distribution. Such a large hiatus occurred especially between the Asiatic continent and Australia, in which hiatus the species was never observed.

Very recently, however, Dr C. A. BACKER submitted to the Rijksherbarium some grasses from the island of Soemba. Among them there was plenty material of *Acrachne verticillata,* collected already in the year 1924 on that island by the veterinary surgeon at Soemba. This is the first time that *Acrachne* is recorded from Malaysia and at the same time the new habitat bridges the gap mentioned. We must, however, not forget that the genus has, in its various centres of dispersal (Abyssinia, British India, Tonkin and Australia), a rather limited distribution; in Tonkin it was found by Balansa along the river Tu-Phap, the only locality hitherto observed and in Australia the grass is only known from North Australia and from Queensland, whereas it seems to be more common in the plains of British India (Gwalior, Kashmir, Punjab). It is very probable that this discontinuous distribution may be explained by accepting that in some localities the grass is introduced. It is an annual grass and the caryopsis is unlike that of other grasses provided with a deciduous pericarp, which soon is detached. Such a membranous pericarp swells up in water and in this way the fruits are more easily dispersed; the hard and coarsely rugose, grooved grain is afterwards, when becoming dry, easily removed from the pericarp. As the grass is growing in rough uncultivated places, especially along the rivers or in the vicinity of watercourses, it may be supposed that the seeds are distributed by birds over rather long distances.

I wish to memorate that another annual grass, viz. *Aristida Cumingiana* Tr. et Rupr., has almost the same distribution as *Acrachne*. Occurring in North Africa (Senegal and Abyssinia), it has its main area from British India eastwards to China. It occurs also in the Philippines and was abundantly collected on the island of Celebes by Dr Kjellberg in Aug. 1929 near the lake of Towoeti. Although more coherent in its distribution, it shows the same gap between British India and Abyssinia. It is not difficult to find other examples among the grasses. It seems to me that it is particularly the category of older genera consisting of perennial species with more primitive characters that have a similar distribution; the same category may also comprise annual grasses with primitive characters, although in the last group we cannot deny the possibility of recent introductions, especially in annual species of *Aristida*, a genus which is, in its much reduced spikelet-characters, not very primitive.

VICARIOUS GRASSES, AS DEMONSTRATED BY A NEW SPECIES OF PHALARIS FROM SOUTH AMERICA

by

Dr J. TH. HENRARD.

(National Herbarium, Leiden).

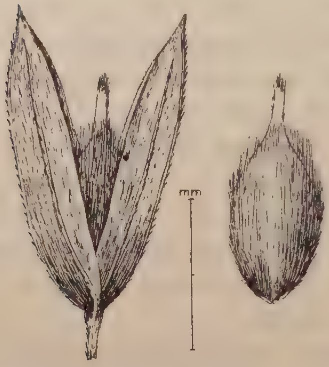
Among the grasses, preserved at the Rijksherbarium, one of the most valuable collections is certainly that of the well-known agrostologist and collector, B. BALANSA. It contains not only the types of the grasses, described by himself, but also very beautiful material, received by him from his contemporaries. All his European and Oriental grasses, those collected by him in New Caledonia, Tonkin and Java, besides a rich material from his travels in Paraguay and Argentina, are represented in this collection together with a beautiful set of ARECHAVALETA's grasses form Uruguay. The material is in extraordinarily good condition and was very completely collected by him. I could already describe many novelties from this collection. One of these is particularly interesting on account of questions of geographical distribution.

Various botanists have called attention to the fact that there is a rather striking concurrence in the floras of Argentina and some of the southern States of North America and it was STANDLEY who pointed this out, giving a list of analogous species from both countries. It is true that in some cases grasses of the southern States of North America occur in Argentina too. I have already had the opportunity to emphasize this, but generally speaking the coincidence of grasses of both parts of the earth mentioned here, is not so very large if we study the plants more intensively. What I mean is this: in many cases and at first sight, or studying the principal features, a resemblance is very striking, especially also as to the habit and the more prominent characters. But on comparing such plants from North America with the corresponding plants from Argentina, it appears in most of the cases that the two species are not identical. Argentina species of the so very difficult genus of *Setaria* certainly closely resemble some species from Mexico or the southern Unites States, but in my opinion, they do not belong to the same species. It was especially the genus *Aristida* which, after an exhaustive study, gave me a better idea of these so-called "succedaneous" species. As, however, such Argentina species of *Aristida* differed in a great many minor points from the North American representatives of this group, it was impossible to consider them as really identical and I was so convinced of their specific distinction that I did not hesitate to accept them as new species. It is not difficult to find in other genera of grasses similar convergencies which, in reality, do not exist. Resemblance is only relating to the general habit and the external or easily visible characters, but a great many minor, but very constant and not less striking characters are to be found, through which we are justified to consider them as different species.

Such a species I wish to treat here. In Balansa's Herbarium Platense (1874—1875) I found years ago an annual *Phalaris*, which I recognized as a new species and which I named *Phalaris platensis.* I had the intention to publish this species in the future. Meanwhile in the Netherlands there was found on ballast at Vlaardingen near Rotterdam, an annual species of *Phalaris* which, submitted to the late Prof. A. Thellung, the well-known specialist for adventitious plants, was identified by him as the *Phalaris Lemmoni* Vasey from California. This species is figured in Vasey's work: Grasses of the Pacific Slope. Illustrations of North American Grasses. Vol. II (1893) pl. V.

A fragment of the plant, collected on ballast in the Netherlands, preserved in the herbarium of Mr P. Jansen at Amsterdam, was received from him and although agreeing at first sight with Vasey's plate, I could not accept it as belonging to Vasey's *Phalaris Lemmoni* but found that it better agreed with the plant from Argentina, named by me *Phalaris platensis.* Afterwards the same species was once more collected near Nijmegen, also on ballast, by Mr Kern.

I expressed my doubts as to the identification as *P. Lemmoni* to Mr Jansen, at the same time indicating that the ballast plants were in my opinion introduced from La Plata and not from California and that our plants of the Netherlands were better considered as a different species, viz. *P. platensis.* Meanwhile I could study very good material of Vasey's species from California and always found the same differences with the Argentine plants of Balansa. Mr Jansen, who is responsable for the treatment of the grasses in our manuals of the flora of the Netherlands, accepted my ideas, after having seen my drawings and now my unpublished name found its way in a new edition of our "Schoolflora" of the Netherlands by H. HEUKELS, where in a key this species was very shortly memorated in the Dutch language. This may be the reason why my species was not inserted in the Index Kewensis.

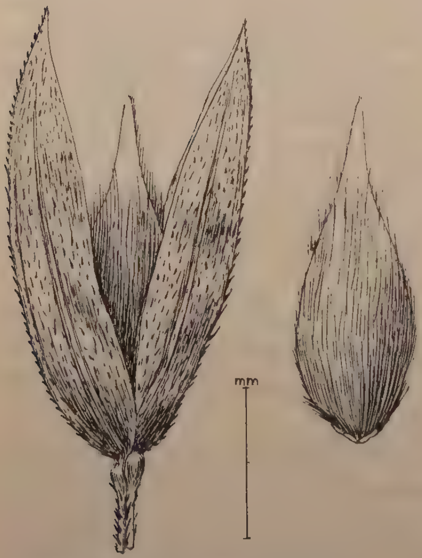


Phalaris platensis HENR., from type specimen; whole spikelet and fruit.

Afterwards I received from Dr PARODI the same grass under the name of *Phalaris Lemmoni* VASEY from Buenos Aires and very recently more material from Uruguay collected by Mr ROSENGURTT and his fellow botanists. All the South American material is very uniform and at the same time different from the material from California.

VASEY's species is always more robust, with larger spikelets, up to 5 mm long, and especially characterized by the fruits enclosed by the lemmata, which are very gradually narrowed into a naked point.

If both plants were growing together, without a distinct geographical distribution, we could be inclined to accept the differences as being not specific and to place our Argentine plant as a variety under *P. Lemmoni* VASEY. However, now that the striking differences are supported by a totally different geographical distribution, both plants are better considered as two different, vicarious species.



Phalaris Lemmoni VASEY, from type locality; whole spikelet and fruit.

The material of *P. Lemmoni* VASEY, seen by my, was mainly received from my late friend A. S. HITCHCOCK. I studied the following material from California: Butte County, near Nelson, A. A. HELLER no. 5447; Santa Clara County, near Saratoga, R. L. PENDLETON no. 355 (various specimens, also Amer. Gr. Nat. Herb. no. 629). These localities are in the foothills of the

Santa Cruz Mountains, at an altitude of 150 m, Vasey's type being collected at "Santa Cruz, California". The species grows in wet places in heavy clay soil; San Diego County, near San Diego, in depressions in clay soil. T. S. Brandegee no. 3425.

The two figures, given in this paper, enlarged on the same scale, demonstrate the differences. I give here a short description of the type of *Phalaris platensis* in Balansa's herbarium.

Phalaris platensis Henrard, nov. spec. — Annua, erecta vel subgeniculato-adscendens, circa 3.5 dm alta, vulgo minor. Culmi striati, paucinodes, nodis glabris. Vaginae arctae, internodiis multo breviores, multinervosae, albo-marginatae, glabrae, ligula albida, elongata, interdum ad 4 mm longa, glabra, laminae ad basin distincte auriculatae, auriculis flavescentibus distincte cartilagineis, inferiores ad 10 cm longae, superiores vulgo breviores, sensim angustatae, multinervosae, utrinque subscaberulae; pedunculus inflorescentiae vulgo longe exsertus, si breviter exsertus pedunculo vagina subinflata circumdato. Panicula spiciformis, densa vel a basi breviter interrupta, spiculis glomeratis, pedicellis brevibus scaberulis. Spiculae circa 4 mm longae, lanceolatae, glumae inferiores scabrae, basi breviter connatae, 3-nerviae, nervis scabris, superne sensim, apice subabrupte acuminatae, glumae duae superiores rudimentariae, squamiformis, aequales, minutae, penicillatae, glumae fertiles coriaceae, subcompressae, longe adpresse pubescentes, subabrupte in rostro cylindrico glabro, lateraliter apicemque ciliolato, productae, circa 3 mm longae.

Argentina: La Plata, station de San Vincente, près de Buenos-Aires, dans les prairies naturelles, 5 Déc. 1875; leg. B. Balansa. *Typus* in Herb. Lugd. Bat. sub no. 909.74—456 — Buenos Aires, Villa Ortugar, 20 Nov. 1929: leg. L. R. Parodi no. 8968.

Uruguay: Dép. Soriano, Juan Jackson, Sta Elena, Déc. 1937: Hb. Rosengurtt no. 534; Dép. Cerro Largo, Rio Negro, Palleros, Déc. 1937; Hb. Rosengurtt no. 1277 et 1937.

Netherlands: on ballast, Vlaardingen near Rotterdam, in the year 1902 leg. P. Jansen et W. H. Wachter; Nijmegen, leg. Kern.

That it is correct to accept such allied forms as distinct species is proved by another example in the genus *Phalaris*. We know that *P. canariensis* L. and *P. brachystachys* Link differ only in one single character, which is only detected by opening the spikelet and by looking for the little scales at the base of the fertile glumes. Notwithstanding this apparently futile character, we all agree with Thellung's treatment of the genus *Phalaris* in his classic work on the flora of Montpellier, where *P. canariensis* and *P. brachystachys* are distinguished as two dif-

ferent species. On account of these species THELLUNG says: "il faut cependant faire remarquer que les deux espèces, quoique extrêmement semblables par le port, sont pourtant très distinctes par les charactères tirés de la grandeur relative des glumes supérieures, et qu'on n'a pas encore trouvé les moindres formes intermédiaires."

THE GENUS STACKHOUSIA IN THE MALAY ARCHIPELAGO

by

F. I. BROUWER

(Botanical Laboratory of the University, Groningen, Netherlands).

This publication is based on herbarium materials which were kindly placed at the author's disposal by the Directors of the Herbarium of the Buitenzorg Botanic Garden (B), the Leiden National Herbarium (L), the Herbarium of the Utrecht University (U), and the Herbarium of the Berlin-Dahlem Botanical Museum (BD), for whose kind help the author wishes to render his best thanks.

Stackhousia

SMITH, in Transact. Linn. Soc. London, IV (1798) 298. Most important literature: BENTHAM & HOOKER FIL., Gen. pl., I, 1 (1862) 371; BENTHAM, Fl. austr., I (1863) 404; in DE CANDOLLE, Prodr., XV, 1 (1864) 499; PAX, in ENGL. & PR., Nat. Pflanzenfam., III, 5 (1896) 233; BAILEY, Queensl. Fl., I (1899) 263; PAMPANINI, in Bull. Herb. Boiss., sér. 2, V (1905) 912; VI (1906) tab. 13.

Flowers regular, hermaphrodite. Calyx 5-merous, sepals usually more or less connate, rarely free. Corolla 5-merous, perigynous or nearly hypogynous; petals with long claws, rarely entirely free, usually free in the lower portion, connate in the upper portion of the claws; lobes 5, spreading, imbricate. Stamens 5, inserted on the margin of the calyx tube, free, usually different in length, included in the corolla tube. Ovary 2—5-, but usually 3-celled, each cell with one erect anatropous ovule; style with 2—5, usually 3, stigmatic lobes. Fruit with 2—5, usually 3, one-seeded cocci and a central columella; seed with membranous testa, fleshy albumen, straight embryo, short cotyledons, and inferior radicle. — Herbs, annual, or perennial with a rhizome. Leaves spread, entire, without stipules or with very small ones. Flowers in groups in the axils of bracts, the groups arranged in terminal racemes.

Distribution: Australia, nearly 19 species, Tasmania, 4 species, New Zealand and the Malay Archipelago, one species each. In the Malay Archipelago only:

Stackhousia intermedia BAILEY — *Stackhousia muricata* (non LINDLEY 1836) BENTHAM, Fl. austr., I (1863) 408, quoad Philipp.; in DE CANDOLLE, Prodr., XV, 1 (1864) 501, quoad Philipp.; FERN.-VILLAR, Noviss. Append. (1880) 47; VIDAL, Phan. Cuming. Philipp. (1885) 103; Rev. Plant. Vasc. Filip. (1886) 90; BAILEY, Queensl. Fl., I (1899) 264, quoad Philipp.; *Stackhousia intermedia* BAILEY, in Queensl. Agric. Journ., III, 4 (1898) 281; in Queensl. Fl., I (1899) 264; PAMPANINI, in Bull. Herb. Boiss., sér. 2, V (1905) 1149, cum forma *Philippinensi*; BAILEY, Compreh. Catal. Queensl. Pl. (1913) 100, fig. 81; DOMIN, in Bibl. Bot., XXII, 896 (1927); *Stackhousia viminea* (non SMITH 18...) VOLKENS, in Bot. Jahrb., XXXI (1902) 467; *Stackhousia viminea* var. *micrantha* [an BENTHAM, Fl. austr., I (1863) 408; in DE CANDOLLE, Prodr., XV, 1 (1864) 501?] LAUTERBACH, in SCHUM. & LAUTERB., Nachtr. Fl. Deutsch. Schutzgeb. Südsee (1905) 305; *Stackhousia intermedia* forma *Philippinensis* MERRILL, in. Philipp. Journ. Sc., Bot., XI (1916) 286; in Enum. Phil. Fl. Pl., II (1923) 488; DOMIN, in Bibl. Bot., XXII, 897 (1927); *Stackhousia tenuissima* var. *ramosa* VAN STEENIS, in Nova Guinea, XIV (1927) 307 [an *St. tenuissima* PAMPANINI, in Bull. Herb. Boiss., sér. 2, V (1905) 1147?]

Probably annual, entirely glabrous. Root fusiformous, 4—5 cm long, nearly 1.5 mm thick above, attenuate, with fibrous ramifications. Stem erect, 6—50 cm long, 1.5 mm thick at the base, gradually attenuate towards the almost filiformous, angular tip, little branched and nearly always in the basal portion only, with erect branches, terete, striate, leafy in the lower portion, terminating into 1—20 cm long, spicate inflorescences. Leaves spread, on distances of 0.5—3 cm, linear, sessile with attenuate base, 0.75—2 cm long, 0.2—1 mm broad, the lower ones obtuse, the upper ones acute, thickish, without visible nervation or only the midrib visible. Flowers in groups of 2 or 3 (rarely single) in the axils of bracts, on distances of 0.3—2 cm, forming lax terminal racemes, the upper groups with 2 bracteoles and 1—3 flowers, the lower ones with more numerous bracteoles and up to 5 flowers; bracts roundish-ovate, strongly acuminate, fimbriate dentate, nearly 0.75—1 mm long, 0.5 mm broad, membranous with exception of the midrib; bracteoles like the bracts, but more strongly dentate and less acuminate; pedicels terete, 0.75—1.25 mm long, here and there indistinctly articulate. Calyx syntepalous, the tube short-campanulate or later more infundibuliformous, nearly 0.5 mm long, the lobes 5, ovate, acuminate, nearly 0.5 mm long, irregularly fimbriate-dentate, with membranous margin. Corolla inserted on the margin of the calyx-tube, sympetalous, hypocrateromorphous, the tube cylindrical, nearly 2 mm long, 0.5 mm wide, divided into 5 petals in the lower portion over nearly 0.3 mm, the lobes strongly acuminate, ovate-oblong, nearly 0.75 mm long. Stamens inserted on the margin of the calyx-tube, free; filaments filiformous, slightly dorsiventrally flattened, the two shorter ones reaching to the middle, the three longer ones nearly to the margin of the corolla-tube; anthers oblong, very obtuse and emarginate at the base and the apex, nearly 0.6 mm long and half as broad, introrse, dithecic, quadrilocular. Ovary subglobose, 0.3—0.4 mm long and broad, 3-lobate and 3-celled, with one ovule in each cell. Style straight, 0.4 mm long, divided in its upper portion into 3 linear stigmata. Fruit composed of 3 cocci that are roundish-ovate, nearly 1.5 mm long, and 1 mm broad, with reticulate surface, and containing one seed. (Description from all the materials listed below.)

Among the specimens of *Stackhousia* from the Malay Archipelago examined by me, I cannot distinguish more than a single species. This species was identified by PAMPANINI (*l. c.*) with BAILEY's *St. intermedia,* and, in my opinion, rightly. PAMPANINI did not examine other numbers than CUMING 976, and based on it a *forma Philippinensis.* MERRILL followed him in this respect, comprising, under this name, also specimens from Sumatra, Amboina, and the Caroline Islands. The distinctive characters, ascribed by PAMPANINI to this form, are of so little importance, that it seems impossible to distinguish it from other forms of the species.

VOLKENS (l. c.) mentions his numbers 396 and 488, from Yap, as *St. viminea* SMITH. I saw his no. 396, but in my opinion it is only *St. intermedia.*

LAUTERBACH (l. c.) determined SCHLECHTER 13854, BIRO 31, and NYMAN 1073, as *St. viminea* var. *micrantha* BENTHAM. I examined all these numbers and think they are *St. intermedia.* Probably LAUTERBACH determined his plants with BENTHAM's monograph of the genus in his Flora Australiensis, or in DE CANDOLLE's Prodromus, and in that case could not fail to arrive at *St. viminea* var. *micrantha.* With BAILEY's key in the Queensland Flora, however, one arrives at *St. intermedia.* According to BAILEY, his *St. intermedia* has the leaves "very narrow, subulate, pointed", *St. viminea,* on the contrary, "oblong or linear". Also with PAMPANINI's monograph one determines the same numbers as *St. intermedia,* as *St. viminea* is perennial, *St. intermedia* annual. Judging from the shape of the roots, our plants must be annual.

LAUTERBACH writes moreover: "Die Art ist von Australien und den

Philippinen, die Varietät von der Nordküste Australiens und den Karolinen bekannt". I found neither the species mentioned from the Philippines, nor the variety from the Caroline Islands.

BENTHAM mentions *St. muricata* (ll. cc.) from the Philippines. He says (Fl. austr. 1, p. 408): "This species, which we have also from the Philippine Islands, varies considerably and sometimes approaches *St. viminea*, but the leaves are never so broad, and the corolla lobes obtuse." From this, it is evident that he alludes to a form that is intermediate between *St. muricata* and *St. viminea*, i. e. *St. intermedia*. He furthermore says: "Some smaller specimens, like those from the Philippine Islands, are less branched and perhaps sometimes annual." This remark also indicates *St. intermedia*. Very probably BENTHAM examined no other specimens than those collected by CUMING.

According to PAMPANINI, the corolla lobes of *St. muricata* are obtuse, and this is not the case in the Philippine plants. Moreover he describes *St. muricata* as perennial, whereas all the specimens from the Malay Archipelago appear to be annual.

VIDAL (l. c.) cites the type number of *St. intermedia* f. *Philippinensis* (CUMING 976) as *St. muricata*. BAILEY cites BENTHAM literatim, and consequently mentions *St. muricata* for the Philippines. It is peculiar, that he does not mention the Philippine specimens under *St. intermedia*, which he describes immediately below.

VAN STEENIS (l. c.) bases *St. tenuissima* var. *ramosa* on the number GJELLERUP 499, distinguishing it from the species as follows: "Caulis filiformis, nonnunquam ramosus, circ. 1.5 mm crassus, 35—60 cm longus; folia 1.2—2.3 cm longa, spicae 12—15 cm longae, cocci ovati, distincte reticulati 1.2—1.5 mm longi." When determining GJELLERUP's plant with PAMPANINI's monograph, one must, indeed, arrive at *St. tenuissima*, based on a specimen of SCHULZ's no. 303, in the St. Petersburg Herbarium. Comparing, however, all the New Guinea plants listed below, including SCHULZ 303 from Adelaide, we must acknowledge that they are somewhat different from the other plants from the Malay Archipelago. The stems are longer, thinner, straighter, and bear only few leaves, sometimes no leaves at all, moreover the tepals are somewhat more triangular. But in the inflorescences, flowers, and fruits, no further differences of any importance can be discovered. I had not the opportunity to examine the specimen of SCHULZ's no. 303 in the Petersburg Herbarium, but I examined the same number from the Berlin-Dahlem Herbarium, which agrees with GJELLERUP's plant, with exception of the fact that it is quite leafless. These are the grounds on which I base my opinion that PAMPANINI's *St. tenuissima* is the same as the New Guinea variety of *St. intermedia.* In this connection, I must point out that PAMPANINI, in his monograph, describes not only *St. tenuissima,* but also *St. virgata, St. aphylla,* and *St. micrantha,* as new species closely allied to *St. intermedia,* whereas for all these he only mentions slight differences. *St. aphylla* is even based on the same number as *St. tenuissima,* viz., SCHULZ 303, though on the specimen in the Brussels Herbarium. I therefore strongly doubt whether all these species are more than slight varieties of *St. intermedia.*

Distribution.

Sumatra: Batak Regions, BOORSMA s.n. (B); Karo Plateau near Koetabangoen, w. of Kabandjahé, on the Goenoeng Batoegadjah, 600—1400 m alt., 16 IV 1919, GALOENGI 245 (B, L), flowers yellow; Karo Plateau, Mosweg, km 125, 1918, BERNARD s.n. (B); Toba Plateau near Prapat, abandoned ladang, IV 1931, FREY-WYSSLING 58 (B); s. of Prapat, in grass vegetations, IV 1927, BEUMÉE A. 447 (B); near Sitorang, wet open place near swamp, 950 m alt., 21 V 1896, OUWEHAND 169 (B), corolla white, common; shooting-range near Lagoe-Boti, on dry sandy ground, 900 m alt., 1 III 1897, OUWEHAND 248 (B, L, U), stems longitudinally grooved, here and there with small black spots, calyx yellow-green, persistent, corolla yellow, leaves thickish, with one nerve; Plateau of Habinsaran, e.s.e. of Lake Toba, grassy wildernesses, especially on abandoned fields, 1200—1300 m alt., 11 V 1919, LÖRZING 6472 (B, L), not rare, flowers yellow, typical for grassy regions, especially when formerly cultivated; Middle-Habinsaran, near Parsoboeran, grassy wildernesses, 1070 m alt., 13 XI 1920, LÖRZING 7787 (B), flowers yellow.

Celebes: Dako, north coast near Gorontalo, between grass, 4 V 1909, ROTHERT s.n. (B).

Boeroe: 1859—1860, DE VRIESE & TEYSMANN s.n. (L); Kajeli, on grassy plains, TEYSMANN 1847 H. B. (B).

Amboina: ZIPPELIUS s.n. (L); VII—XI 1913, C. B. ROBINSON 1766 (B, BD, L); 1913, *idem,* s.n. (B); hilly ground between lalang, 100 m alt., 17 IV 1926, DOCTERS VAN LEEUWEN 8669 (B, L); Saparoea, in the woods, 11 V 1842, FORSTEN s.n. (L).

New Guinea: Cyclope Mts., 300 m alt., 16 VI 1911, GJELLERUP 499 (B, BD, L, U), type of *St. tenuissima* var. *ramosa* VAN STEENIS; Simbang, 20 VIII 1898, BIRO 31 (BD); on the Ramu River, I 1902, SCHLECHTER 13854 (B, BD); Finschhafen, 13 IX 1899, NYMAN 1073 (BD); Malolo Mission, Salamaua, Cogon trail hill, 800 ft alt., 17 VIII 1935, CLEMENS 2 (BD), flowers straw color, pale.

Australia: Thursday Islands, 14 V 1901, JAHERI s.n. (B, L); "New Holland", anno 1770, BANKS & SOLANDER s.n. (BD); Port Darwin, 4 miles N.E., 1 II 1925, BLEESER 135 (BD); North Queensland, Kelsey Creek, MICHAEL 982 (B); Adelaide, 14 V 1896, SCHULZ 303, coll. SCHOMBURGK, type no. of *St. tenuissima* and *St. aphylla* PAMPANINI.

Philippine Islands: Luzon, Ilocos Norte Prov., Bangui, II—III 1917, BUR. SC. 27525 coll. RAMOS (B); Cagayan Prov., II 1909, FORESTRY BUR. 16584 coll. CURRAN (BD); Zambales Prov., Anuling, XI—XII 1924, BUR. SC. 44588 coll. RAMOS & EDAÑO (B); Sorsogon Prov., Sorsogon, HAENKE s.n. (BD; Culion Island:

X 1922, BUR. SC. 41330 coll. RAMOS (B, BD, L); Guimaras, 24 XII 1912, BUR. SC. 18009 C. B. ROBINSON (B, L).

Caroline Islands: Yap, mountain meadows, 29 I 1900, VOLKENS 396 (B, BD); *ibidem*, 13 III 1900, VOLKENS 488 (BD).

Palau Islands. Korror, in a taro field, 1907, Father RAYMUNDUS 139 (BD), v.n.: *choudhoródoch*; Korror, 1910, Prof. KRAEMER s.n. (BD); Korror, step-like formation with grass up to knee height, with some *Pandanus* trees, 20—30 m alt., 5 II 1914, LEDERMANN 14030 (BD), flower pale yellow, leaves grey-green, v.n.: *chamgĕtĕlchorachab*.

THE GENUS MYOPORUM IN THE NETHERLANDS' INDIES.

by

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The herbarium specimens upon which this publication is based were placed at the author's disposal by the Directors of the Herbarium of the Buitenzorg Botanic Gardens (B) and the Leiden National Herbarium (L), to whom the author expresses his best thanks for their kind help.

Myoporum

BANKS & SOLANDER, ex FORSTER, Prodr. (1786) p. 44, n. v. Most important literature: R. BROWN, Prodr. (1810) p. 515; ENDLICHER, Genera (1839) p. 642; A. DE CANDOLLE, in D.C., Prodr., XI (1847) p. 706; BENTHAM, Fl. austr., V (1870) p. 2; BENTHAM & HOOKER FIL., Gen. pl., II, 2 (1876) p. 1124; F. v. MUELLER, Descr. & Ill. Myop. pl. Austr. (1886) t. 56—72; BAILLON, Hist. pl., IX (1888) p. 420, ic. 487; WETTSTEIN, in ENGL. & PR., Nat. Pflanzenfam., IV, 3b, p. 359, ic. 144, n-v, 142, 143 (1895); BAILEY, Queensland Fl., IV (1901) p. 1154; DOMIN, in Bibl. Bot., XXII, fasc. 89, p. 1163 (1929); KRÄNZLIN, in FEDDE, Repert., Beihefte, LIV (1929) p. 14.

Flowers zygomorphous, or rarely almost actinomorphous. Calyx persistent, divided down to the middle or nearly to the base into 5 lobes or segments not enlarged after flowering. Corolla with 5 lobes imbricate in bud, nearly equal, or the anterior ones rather larger; corolla tube usually short and almost campanulate or shortly cylindrical at the base. Stamens usually 4, in pairs of unequal length, inserted in the corolla tube and alternating with its anterior lobes, rarely almost equal and as many as corolla lobes, scarcely or shortly exserted; anther cells opening longitudinally, at first nearly parallel, confluent at the apex, and usually forming a single reniform cell when open. Ovary superior, not lobed, 2- to 10-celled, with one ovule in each cell, or rarely 2-celled with 2 ovules in each cell; ovules pendulous, anatropous and apotropous; style simple, undivided, or obscurely notched at the apex. Drupe ovate or subglobose, usually small but more or less succulent, the endocarp 2- to 10-celled; seeds usually solitary in each cell, with endosperm; embryo straight, with a superior radicle. — Shrubs, trees, or prostrate plants. Leaves spread or rarely opposite, undivided, entire or toothed. Flowers axillary, single or usually in clusters of 2, 3, or more. Bracts at the base of the pedicels very small or none, no bracteoles on the pedicels. Flowers small, white, or yellow, or pale rose-red.

Distribution (according to KRÄNZLIN): S. China, Japan, Yokugi Islands, Lu-Chu Archipelago, Formosa, New Guinea, Australia and Tasmania, Hawaii Islands, Admiralty Islands, Norfolk Island, New Caledonia, New Hebrides, Kermadec Islands, New Zealand, Rodriguez Island, Mauritius.

In the area dealt with only one species:

Myoporum papuanum KRÄNZLIN — *Myoporum tenuifolium* (non FORSTER 1786) VALETON, in Bull. Dép. Agr. Ind. Néerl., X (1907) p. 61; *Myoporum papuanum* KRÄNZLIN, in FEDDE, Repert. sp. nov., XXII (1926) p. 338; *idem*, Beihefte, LIV (1929) p. 4.

Young twigs terete, 1—5 mm in diameter between the adult leaves, attenuate towards the extremities, glabrous. Leaves at distances of 3—20 mm; petiole 4—10 mm long; lamina lanceolate, 3.5—10 cm long, 0.5—1.5 cm broad, acute or somewhat acuminate towards the acute apex, attenuate into the petiole, quite entire, chartaceous, entirely glabrous, penninervous with 3—5 lateral nerves on each side of the midrib. Flowers in a median series of 2—6 in the axils of normal leaves, on pedicels 5—9 mm long, 0.3—0.5 mm in diameter; whole flower 5—7 mm long. Calyx nearly regular, entirely glabrous, usually 5-merous, rarely 4-merous, 1.5—2 mm long, its tube cup-shaped, 0.3—0.5 mm long, 1.5—1.7 mm wide, its segments narrow-triangular, 1—1.7 mm long, 0.5—1 mm broad, often rather strongly acuminate towards the acute apex. Corolla nearly regular, 4—6-merous, usually 5-merous, entirely glabrous inside and outside, also in bud, oblong-ellipsoidal or more ovate in the state of adult bud, 4.75—6.75 mm long after opening, its tube campanulate-infundibuliformous, 3—4.25 mm long, 3—4 mm wide, its lobes spreading, 1.75—2.5 mm long, 1.5—2 mm broad, rounded at the apex. Stamens 3—5, usually 4 in number, entirely glabrous, the two longer ones 3—3.2 mm long, with filaments 2.3—2.5 mm long, inserted nearly in the middle of the corolla tube, the two shorter ones 2.25—3.2 mm long, with filaments 2—2.5 mm long, inserted somewhat below the middle of the corolla tube; anthers 0.5—1 mm long, 0.8—

1 mm broad. Pistil 3.75—5.5 mm long, entirely glabrous; ovary oviformous, conical towards the apex, rounded at the base, 3—4-celled, 1.5—3 mm long, 0.9—1.5 mm in diameter; style terete, 2—3.5 mm long, 0.3—0.4 mm in diameter; stigma 0.1—0.2 mm high, 0.4—0.5 mm in diameter. Fruit-bearing pedicels 6—11 mm long, 0.4—0.5 mm in diameter. Drupe oviformous in the dry state, acute, entirely glabrous, with reticulate wrinkles, 3—4-celled, up to 4.5 mm long, 4 mm in diameter, bearing a 3—4 mm long filiformous style or a 0.75 mm long style rudiment. (Description from all the specimens listed below.)

KRÄNZLIN describes the corolla lobes as "intus ad orificium pilis sparsissimis obsiti". VALETON, however, describes the corolla as entirely glabrous, inside and outside, and so I found it, in bud as well as in the open state. KRÄNZLIN mentions that 3 of the corolla lobes are a trifle longer than the other two and bear a minute mucro at their apex. I did not discover these small mucros, and the differences in dimensions of the lobes appear to me to be very slight.

Determining the New Guinea plants with BENTHAM's Flora Australiensis (V, p. 2—3), one must arrive at *M. acuminatum.* This species appears to be very polymorphous, and BENTHAM distinguishes 4 races of it. Our New Guinea plants agree as well with the race *angustifolium* (= *M. montanum* R. BR.), as with the race *parviflorum,* and more especially with the form from New Caledonia, with glabrous corolla (= *M. tenuifolium*).

KRÄNZLIN split up BENTHAM's *M. acuminatum* into 4 species, which nearly agree with BENTHAM's races, but are more sharply defined against each other. The New Guinea plants agree fairly well with his *M. montanum,* which is synonymous with BENTHAM's race *angustifolium.* They, however, neither exactly agree with any of KRÄNZLIN's species, nor with any of BENTHAM's races, and it seems advisable, therefore, to keep them, provisorily, apart as a distinct species. Both authors, however, based their distinctions upon very few specimens only, and it appears, therefore, quite possible that, after the examination of more abundant materials, *M. papuanum* will prove to be synonymous with some Australian species or variety.

According to KRÄNZLIN, the New Guinea plants come very near to *M. montanum,* but differ from it by more slender and longer-infundibulous flowers and smaller calyces. The latter character cannot be of much importance, as KRÄNZLIN describes the calyx of *M. montanum* as 1.75—2 mm long. According to him, *M. papuanum* shows, as regards the form of the corolla, a greater resemblance with *M. tubiflorum* and

M. tenuifolium, which are said to have exactly actinomorphous flowers. According to the descriptions given by KRÄNZLIN, *M. tubiflorum* and *M. tenuifolium* also differ from *M. papuanum* by leaves that are 2—2.5 cm broad, a corolla that is slightly bearded inside, and a style that is somewhat hairy. From this it is evident that his *M. montanum* almost entirely agrees with his *M. papuanum,* "zur vollendeten Täuschung", as he says himself. For KRÄNZLIN, however, a strong argument for the specific distinction lies in the fact that the distance between the distribution areas is large, whereas the present author, on the contrary, would be more inclined to accept this as an argument for the idea, that *M. papuanum* might be a geographical variation of a more polymorphic Australian species.

Distribution.

Northern New Guinea: Jotifa (?) Bay, coastal range of a thinly wooded peninsula, on muddy sand, 1—2 m alt., 16 IX 1911, K. GJELLERUP no. 682 (B); tree nearly 3 m tall, with white odourless flowers, fruits of the size of a pepper-fruit, red-brown, succulent, the leaves light-green, the bark light brownish-grey; few specimens scattered. Humboldt Bay, prof. WICHMANN's Expedition, 1903, coll. ATASRIP no. 86 (B, L).

REVISION OF THE SARCOSPERMATACEAE

by

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(National Herbarium, Leiden).

Introduction.

The genus *Sarcosperma* was excluded from the Sapotaceae by the first-named writer in 1925, the group being considered as of family rank. In 1926 the same author published a concise and fragmentary revision of the monotypic order, in which two new Malaysian species were described. The continental species, however, were merely quoted from literature. To this a key was added.

As since then more material has been collected, it seemed desirable to give a new revision of this small but interesting order. For this purpose materials have, at our request, kindly been sent on loan to the Rijksherbarium (L) [1] from the following institutions:

Royal Botanic Gardens, Kew — K.
Botanischer Garten und Botanisches Museum, Berlin — B.
Musée d'Histoire Naturelle, Phanérogamie, Paris — P.
Botanical Garden, New York — NY.
U.S. National Museum, Division of Plants, Washington — W.
Gray Herbarium and Arnold Arboretum, Harvard University, Cambridge (Mass.), U.S.A. — H.
Botanical Institute, Coll. of Agriculture, Sun Yatsen University, Canton — Ca.

We are pleased to render our best thanks to the directors of these institutions for their valuable help, through which the type specimens of all species and much interesting material could be investigated. Thanks are, moreover, due to the Siamese Legation at London and particularly to Dr A. F. G. KERR for kindly giving information concerning some habitats in Siam.

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[1] Some of these are also in the Herbarium of the Botanic Gardens, Buitenzorg, especially as far as the Malaysian species are concerned.

SARCOSPERMATACEAE

Sarcosperma(ta)ceae H. J. Lam, Bull. Jard. bot. Buitenzorg, Sér. III, Vol. 7, 1925, 248 and Vol. 8, 1926, 18 and in Phil. Journ. Sci. 49, 1932, 143 ss.

Trees or shrubs with latex (always?; with certainty only known in *S. arboreum* and *S. paniculatum*). *Stipules* extant, small and caducous. *Leaves* simple, entire, subopposite or opposite, rarely subverticillate (*S. laurinum*), often with some alternate ones between, penninerved, the petiole sometimes with auricles (stipels) at the top (*S. paniculatum, kachinense*), the blade often with glandular pits in the axils of the secondary nerves or scattered on the surface underneath; tertiary nerves slender but conspicuous, transverse and usually crowded, more or less perpendicular to the midrib. *Inflorescences* consisting of small fascicles or of solitary flowers, placed along racemose or more or less broadly paniculate axillary shoots, the whole of them usually more or less pubescent, rarely densely tomentose (*S. kachinense*) or entirely glabrous (*S. Griffithii*); bracts minute, deltoid. *Flowers* hermaphroditic, little variable, except regarding the indumentum of the calyx. *Sepals* 5, imbricate, with quincuncial aestivation, the two inner ones thinner and with scarious margins. *Corolla* glabrous, more or less infundibuliform, with a short and slightly thickened tube and 5 spreading lobes, which are imbricate in bud. *Staminodes* 5, alternipetalous, inserted in the throat of the corolla and of various shape. *Stamens* 5, epipetalous, the short filaments connate at base with the base of the petals, anthers basifix or very slightly introrse, two-celled, longitudinally dehiscent. *Ovary* superior, glabrous, contracted into a short and stout, more or less truncate style or the stigma capitate or faintly 2-lobed, usually 2-celled, more rarely 1-celled (*S. laurinum, Uittienii*); cells 1-ovulate, the ovules anatropous and apotropous, ascending, attached to the basis of the central axis, integuments 2 (?). *Fruit* drupaceous, usually 1-, rarely 2-seeded, ovoid or oblong, pericarp thin. *Seeds* with a thin-crustaceous pale, non-shining testa. Scar small, round and basal, the hilum close to the micropyle; albumen none, the cotyledons being thick and completely surrounding the inferior radicle — *Monotypic in East Asia.*

Relation with other families — The genus *Sarcosperma* has a long time formed part of the *Sapotaceae,* until it was excluded from that family by the first-named writer. Our present investigations are supporting this opinion and though *Sarcosperma* is certainly related to the *Sapotaceae* and particularly to the genera of the *Planchonellidae* (*Sidero-*

xylon s.s.!), relations to such families as the *Rhamnaceae* are also likely to exist, as will be shown in a separate paper on the probable phylogeny of the group. The instability of its insertion in the Sapotaceae is also demonstrated by its eventual synonyms, three of which (*Apoia, Discocalyx, Reptonia*) are or have been put with the Myrsinaceae, whilst others were supposed to be Olacaceous (*Bracea*), Celastraceous or Combretaceous. Our provisional opinion is that *Sarcosperma* is a relatively old genus, having probably common ancestors with some of the Sapotaceae (latex, fasciculate partial inflorescences [cf. *Planchonella nitida* and also "*Sarcosperma*" *pedunculatum* HEMSL. = *Sideroxylon* spec.], flower and fruit type), with several new (?) acquisitions which are lacking in the last-named order (glandular pits, auricles, subopposite leaves, branched inflorescences [1]) and, moreover, a few characters showing a more advanced phase than is reached in the *Sapotaceae* (2—1-celled ovary), or a more primitive one (basifix anthers). The geographic distribution of some of the species is in support of our suggestion that *Sarcosperma* is a genus in regression or at least stationary.

SARCOSPERMA

Sarcosperma HOOK. F. in BENTHAM and HOOKER F., Gen. Pl. II, 2, 1876, 655; CLARKE in HOOKER F., Fl. Brit. Ind. II, 1882, 535; BAILLON, Hist. d. Pl. XI, 1891, 279; ENGLER in ENGL. und PRANTL, Nat. Pfl. Fam. IV, 1, 1897, 146; KING and GAMBLE, Journ. As. Soc. Beng. LXXIV, 2, Extra nr. 17, 1905, 159 (contin. pag. 369); DUBARD, Ann. Mus. Col. Mars. XX, 1912, 78; LAM, Phil. Journ. Sci. 49, 1932, 145 — *Bracea* KING, Journ. As. Soc. Beng. LXIV, 2, 1896, 101 — *Apoia* MERRILL, Phil. Journ. Sci. 17, 1920, 605. — Generic characters as those of the family — *4 Species in Sikkim, Assam, Upper Burma, Siam and S.W. China, 1 in Sumatra and 1 in various places in Malaysia.*

Interspecific relations — Although the six species maintained are closely allied and, at the same time, well distinguishable, two of them are more or less isolated in a taxonomic sense, viz. *S. laurinum* and *S. paniculatum.* The other four species are more closely linked mutually, viz. in this way: *arboreum-Uittienii-kachinense,* and *arboreum-Griffithii. S. arboreum* seems, in a way, to take a more or less central position, both in a taxonomical and in a geographical sense. The sharing and participation of the principal specific distinguishing features is shown in the following table:

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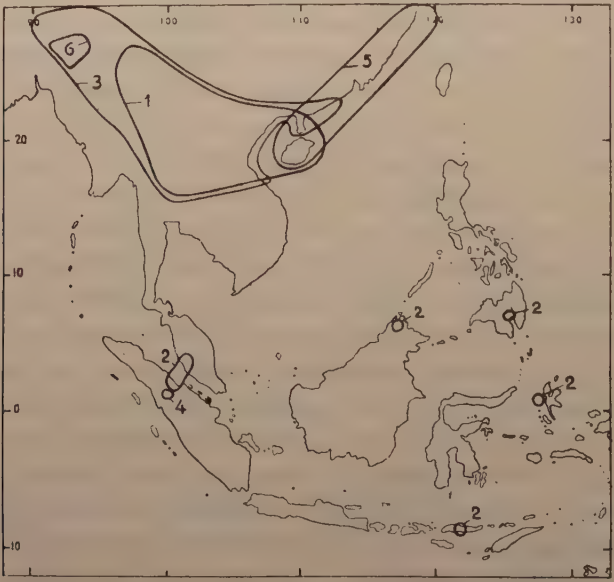
[1] *Aulandra* is the only Sapotaceous genus with an indication towards branched inflorescences (short shoots), known to us.

TABLE I.

Species \ Characters	Auricles	Glandular pits	Leaves pubescent below	Inflorescences pubescent	Ovary	
					2-celled	1-celled
1. kachinense . . .	$\overset{+}{(-)}$	$\underset{-}{(+)}$	$\overset{+}{(-)}$	+	+	−
2. paniculatum . . .	+	+	−	$\underset{-}{(+)}$	+	−
3. arboreum	−	+	−	+	+	−
4. Uittienii	−	−	$\overset{+}{(-)}$	+	−	+
5. laurinum	−	$\overset{+}{-}$	−	$\underset{-}{(+)}$	−	+
6. Griffithii	−	−	−	−	+	−

$\overset{+}{(-)}$ means: usually extant, rarely none; $\underset{-}{(+)}$ means: usually none, rarely extant.



Areas of *Sarcosperma*-species
(for numbers cf. Table I and the text, pp. 187—188).

Geographic distribution (cf. the *map*) — The taxonomic isolation is only fully correlating with a geographic isolation in *S. paniculatum*. The disjunct Malaysian area of this species together with the fact that the tree seems to be scarce in some of its partial areas (especially in the eastern ones) points to a relic nature. In general, the Malaysian areas are strikingly different from the continental ones by their size. In view of the pretty close relations of *S. Uittienii* and *S. kachinense*, it might be suggested that these species are offshoots of ancestors with a larger area and that this is another example of regression. Possibly also *arboreum*-ancestors were involved, as *S. Uittienii* is more or less intermediate between *S. arboreum* and *S. kachinense*. The fact that *S. Uittienii* possesses a 1-celled ovary, and *S. arboreum* and *S. kachinense* a 2-celled one, may be interpreted as an indication that the *Uittienii*-habitat was an excentric one and that the centre of origin of these three species must have been somewhere on the continent.

S. laurinum is the only continental species, the area of which is more or less excentric, which is in accordance with its taxonomical isolation. The fact that *S. laurinum* and *S. kachinense* are found in Hainan, may indicate that these species are relatively old, as they have probably reached that island before it was severed from the mainland.

S. kachinense and *S. arboreum* have about the same area, though that of the last-named species is the larger one. The fact that the former has reached Hainan, and the latter not, does not necessarily imply that *S. arboreum* is the younger species throughout, although it apparently is in the eastern part of its area.

The mutual relation of the areas of *S. arboreum* and *S. Griffithii* is in accordance with their close taxonomical relations.

The species may, finally, be characterized in the following way:

1. *kachinense*: fairly variable in many features (leaf shape, auricles, pits, inflorescences); a common species with a large area; close relations with 3 and 4.
2. *paniculatum*: rather variable (leaf dimensions, branching and size of inflorescences); area strongly disjunct, apparently rather rare in its small partial areas; taxonomically isolated; relic or at least in regression.
3. *arboreum*: somewhat variable in some characters (width of leaf); a very common tree covering a large area; close relations with 1, 4 and 6.

4. *Uittienii*: not very much variable; a few specimens known from a single very small area; close relations with 1 and 3; relic?
5. *laurinum*: somewhat variable (leaf shape, inflorescences); a characteristic, taxonomically isolated species, with a rather large but pretty excentric area, in which it is abundant.
6. *Griffithii*: little variable (leaf shape, etc.); apparently not unfrequent in a small area within the area of 3, to which it is closely related.

Key to the species

1.a. Auricles at the top of the petiole extant (rarely wanting in *S. kachinense*) . 2
b. No auricles at the top of the petiole 3
2.a. Young branches, inflorescences and lower side of leaves conspicuously pubescent, more or less glabrescent; leaves light brown below when dried, pits in the axils of secondary nerves rarely extant, petioles densely tomentose, short (usually less than 1 cm) (*Burma, Siam, S. China*) . . . . **1. S. kachinense**
b. Branches, inflorescences and leaves entirely glabrous or the inflorescences slightly pubescent; leaves dark brown when dried, pits scattered on the lower leaf surface, petioles 1—2.5 cm long (*Malay Peninsula and Archipelago*) **2. S. paniculatum**
3.a. Inflorescences more or less pubescent, glabrescent; leaves 11—36.5 by 3—12.8 cm, often rather broad; secondary nerves 7—16 4
b. Inflorescences almost or entirely glabrous, leaves glabrous, usually rather narrow, 3.7—20 by 1.5—5.6 cm, secondary nerves 5—10 5
4.a. Leaves entirely glabrous; glandular pits always extant in the axils of secondary nerves; pedicels 0.1—0.15 cm long; ovary 2-celled (*Himalaya to Siam and S. China*) . . . . **3. S. arboreum**
b. Leaves slightly pubescent below; no pits in the axils of secondary nerves; pedicels 0.2—0.4 cm long; ovary 1-celled (*Sumatra*) . . . . . . **4. S. Uittienii**
5.a. Leaves obovate-lanceolate to lanceolate, irregularly arranged, narrowly cuneate at base, blunt at apex; glandular pits, if any, in the apical nerve axils only; ovary 1-celled (*S. and E. China*) . . . . **5. S. laurinum**
b. Leaves ovate-lanceolate or oblong-lanceolate, rather regularly opposite, acute at base; glandular pits none or very rare; ovary 2-celled (*Assam*) **6. S. Griffithii**

Type species. No type species can be indicated, as BENTHAM and HOOKER mention the names of three species (1. *S. arborea,* 2. *S. Griffithii,* 3. *S. laurina*) under the generic description.

1. S. kachinense (KING & PRAIN) EXELL, Journ. of Bot. 69, Apr. 1931, 100 — *Combretum kachinense* KING & PRAIN, Journ. As. Soc. Beng. 69, 2, 1900, 169 — *Sarcosperma kachinense* COWAN, Notes Roy. Bot. Gard. Edinburgh XVI, nr. LXXIX, Oct. 1931, 222 — *S. pedunculatum* sensu MERR., Lingnan Sci. Journ. 13, 1934, 66, not of HEMSL. — *S. siamense* FLETCHER, Kew Bull. 1937, 380 — *S. caudatum* MERRILL, ined.

Shrub or tree, branches terete, densely tomentose, glabrescent. *Stipules* subulate, tomentose, 0.3—0.8 cm long, caducous. *Leaves* fairly opposite, oblong, light brown below when dried, ovate-oblong, elliptic or obovate-oblong to lanceolate, acute at base, more or less abruptly acuminate at apex, 8.6—32 cm long, 2.7—10.6 cm broad, acumen 0.7—1.5 cm long, often acute or mucronate, blade glabrous above, more or less pubescent below, glabrescent; secondary nerves 6—11, more or less conspicuous above, prominent below, straight or somewhat curved, especially in the apex, starting at an angle of 40°—65° from the midrib, not joined near the margin, except sometimes in the apex; tertiary nerves often conspicuous above but more prominent below, more or less crowded, almost parallel and regularly arranged at an angle of 100°—110° with the midrib, undulate, more or less curved and 0.1—0.3 cm apart; glandular pits usually lacking, sometimes extant; auricles tomentose, 0.1—0.25 cm long, rarely none; petioles densely pubescent, 0.2—1(—1.4) cm long. *Inflorescences* densely tomentose, broadly and laxely paniculate, 1.3—15 cm long, the branches 1.2—10 cm long, peduncle usually short; or the inflorescences not branched and 1.7—8.5 cm long; flowers in fascicles, pedicels 0.1—0.3(—0.7) cm long, bracts subulate, densely tomentose, 0.1 cm long. *Calyx* densely tomentose without, glabrous within, about 0.3 cm long and 0.2 cm broad, sepals ovate. *Corolla* tube 0.2—0.3 cm long, lobes about 0.3—0.35 cm long and 0.2 cm broad, rounded. *Staminodes* subulate, about 0.2 cm long and 0.1 cm broad. *Stamens* elliptic, 0.15 cm long, 0.075 cm broad. *Pistillum* glabrous, about 0.3 cm long, 0.1 cm broad, style 0.1—0.2 cm long, with capitate stigma, exserting from the calyx, ovary 2-celled. *Fruit* ellipsoid, 1.7—2 cm long, 1 cm in diam., 1-seeded, pedicel 0.3 cm long.

BURMA, Upper Burma, Kachin Hills: Toppin 4271 (*Type specimen*, K), a tree, 10′ high, flow. white in Dec. — Fort Hertz, Hkamti Plain, in jungle, alt. 1200′: F. Kingdon Ward 9054 (H), small tree, young flowers white 20. 12. 1930.

SIAM, Hui Kua, alt. 300 m: A. F. G. Kerr 5027 (*Type specimen of S. siamense*, K), evergreen tree about 6 m high, flow. white, March 1921.

CHINA, S.E. Tibet, 28°25′ N.Lat. and 97°55′ E.Long., in jungle, 2—3000′: F. Kingdon Ward 10199 (H), shrub, stems and under leaf surface rusty pubescent, flow. cream-coloured, 4. 12. 1931 — Yunnan, Szemeo, in forest, alt. 4000′: A. Henry 12768 (H, K, NY), tree 15—20′, flow. white, Dec. 1926; alt. 4500′: Id. 12017 (H, K, W), tree 20′, fr. red on 30 May; alt. 5000′: Id. 13291 (= *S. caudatum* Merr., H), shrub 7′ — Mengtse, S.E. Mountains, in forest, alt. 5000′: A. Henry 13307 (H, K, NY), tree 50′, flow. white, in Nov.; Id. 11424 (H, NY, W), shrub 7′, flow. white-yellow, in Dec. — Kwangsi, on Annam boundary: H. Y. Liang 67431 (Ca), small tree or shrub, leaves green, flow. greenish white, 16. 12. 1935 — Kwangtung, Hainan, in mixed woods: C. Wang 35214 (Ca, H, L, NY), tree, up to 8 m high, bark grey, flow. white, 7. 12. 1933; Chim Shan, Fan Maan Ts'uen, Ling Shui Dist.:

H. FUNG 20109 (H, NY), woody, 4.3 m high, 18 cm diam., fr. red, 3. 5. 1932; in light woods, along riverbank: H. Y. LIANG 64059 (Ca, H, NY), shrub 2 m, petals yellow, stamens white, anthers yellow, flow. on 6. 1. 1934; S. slope of Five Finger Mts., in moist wooded ravine: F. A. MCCLURE 9331 (H, K, NY), tree 10′ high, diam. 12 cm, fr., 28. 4. 1922.

Remarks: An evergreen shrub or a tree 2—8—15 m high, with grey bark, the stem 12—18 cm in diam., growing in jungle, woods and forests between 1000′ and 5000′ alt., the branchlets, leaves and inflorescences more or less rusty pubescent; flowers white or slightly yellowish, greenish or cream-coloured, usually in December, more rarely in November, January or March (Siam); fruit red in April—May.

A species, distinguished by its auricles (rarely absent), its short, woolly pubescent petioles and its pubescent and large inflorescences with relatively large flowers. Its relation is with *S. arboreum*, from which it differs by the auricles, the indumentum and the short and pubescent petioles; and with *S. Uittienii*, from which it is different by the auricles, the occasional glandular pits, the more woolly and longer indumentum and the 2-celled ovary.

2. **S. paniculatum** (KING) STAPF & KING, Icon. Plant. 7, 1901, tab. 2690; LAM, Bull. Jard. bot. Buitenz. Sér. III, Vol. 7, 1925, 248, *fig. 64*, and Vol. 8, 1926, 21 and Phil. Journ. Sci. 49, 1932, 146 — *Bracea paniculata* KING, Journ. As. Soc. Bengal 2, 1896, 54 — *Discocalyx macrocarpa* ELMER, Leafl. Philip. Bot. 8, 1915, 2781 — *Apoia macrocarpa* (ELM.) MERRILL, Phil. Journ. Sci. 17, 1920, 605 — *Sarcosperma breviracemosum* H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, Vol. 8, 1926, 21, *fig. 2*.

Rather large tree, branches terete, glabrous or slightly tomentose. *Stipules* subulate, glabrous, about 0.4 cm long, caducous, scars triangular or linear. *Leaves* opposite or alternate, dark brown when dried, oblong to elliptic, acute or more or less acuminate at base, gradually and bluntly acuminate at apex, 6—28 cm long, 3.5—10.2 cm broad, glabrous at both sides; secondary nerves 6—11, not prominent, straight or curved, starting at an angle of 50°—70° from the midrib, not joined near the margin, except sometimes towards the apex, tertiary nerves more or less conspicuous, not very much crowded and regular, reticulate, 0.1—0.3 cm apart, at an angle of 85°—95° with the midrib, undulate; glandular pits extant, scattered; auricles glabrous, acute, 0.05—0.2 cm long; petioles glabrous or slightly tomentose, 1—2.5 cm long. *Inflorescences* glabrous or slightly tomentose, either paniculate and 1.1—14 cm long, branches 2—9 cm long, or the inflorescences hardly branched and 0.8—1.6 cm long, bracts glabrous, acute, 0.1 cm long; flowers in fascicles or solitary, pedicels

0.1—0.15 cm long. *Calyx* slightly pubescent without, glabrous within, about 0.2 cm long and broad, sepals round or broadly acute. *Corolla* tube 0.1 cm long, lobes obovate, about 0.3 cm long and 0.2 cm broad. *Staminodes* acute, 0.1 cm long. *Stamens* ovoid, 0.1 cm long and broad. *Pistillum* glabrous, 0.2 cm long and 0.1 cm broad, style 0.1 cm long, ovary 2-celled. *Fruit* ovoid, 1.7—2 cm long and 0.7—1.5 cm in diam., 1- or rarely 2-seeded, pedicel 0.3 cm long. Scar of seed 0.3 × 0.4 cm.

MALAY PENINSULA, Perak, Batang Padang, open jungle, on the banks of B. P. River, alt. 300—400′: KING's collector 7970 (K), a tree with spreading branches 50′ high, stem 12—18″ in diam., leaves green, flowers waxy yellow in Aug. 1885; open old jungle, top of low hills, alt. 300—500′: ID. 8086 (*Type specimen*, B, K), tree 50—70′ high, stem 15—20″ in diam., leaves light green, flow. pale greenish white, fr. green, not fully grown in Aug. 1885 — Ulu Bubong, dense jungle, alt. 400—600′: KING's collector 10284 (B), tree 50—70′ high, stem 10—15″ in diam., flow. pale yellow with light green calyx in June 1886; mixed open jungle, alt. 400—600′: ID. 10554 (K), tree, spreading branches, 40—60′ high, stem 18—24″ in diam., flow. pale green, not well open in July 1886; amongst large bamboos, alt. 500—700′: ID. 10835 (B, K, P), tree, spreading crown, 40—60′ high, stem 15—20″ in diam., flow. waxy pale yellow, petals thick, in Aug. 1886 — Locality unknown (Mal. Penins.?): SCORTECHINI s.n. (K) (= n. 288 from Perak?).

SUMATRA, Sum. East Coast, Sibolangit Gardens, alt. about 500 m.: J. A. LÖRZING 10159 (L, K), flow., 25. 7. 1923; Asahan, Hoeta Bagasan: RAHMAT SI BOEEA (BARTLETT) 6878 (H), nat. n.: *kajoe majang rata*, flow. buds, Sept. 1934—Febr. 1935 — Karo-districts, Lau Boeloeh, alt. about 1000 m: FOREST RESEARCH INST. bb. 11981, nat. n.: *perawas samboengan*; nr. Lautkawar, in old forest, rather scarce, alt. about 500 m: ID. bb. 8600 (Herb. Buitenzorg), a tree, 27 m high, bole 17 m high, 0.53—0.25 m in diam., latex white, abundant, nat. (Karo-Batak) n.: *beroe*.

BORNEO, Mt. Kinabalu, Kappok forest margin, grassland, alt. 1500′: J. and M. S. CLEMENS 51286 (L), tree 40′, fr. green on 1. 1. 1934.

TIMOR AND DEPENDENCIES, Flores, Ende, nr. Soekoeria, in second growth forest on andesite, rather scarce, scattered, alt. 1110 m: FOR. RES. INST. bb. 8234 (*Type specimen of S. breviracemosum*, L), tree, 15 m high, bole 11 m high, 0.37—0.21 m in diam., nat. (Ende) n.: *wowo*, flow. buds on 19. 3. 1925; same loc., alt. 1050 m: ID. bb. 8232 (B, K, L, NY), tree, 15 m high, bole 6 m high, 0.3—0.25 m in diam., nat. (Ende) n.: *lama kamba*, buds and very young fr. on 19. 3. 1925.

MOLUCCAS, Ternate, Foramadiahi, alt. about 600 m: BEGUIN 1325 (L), nat. n.: *koeriaba*, flow. on 15. 1. 1924.

PHILIPPINE ISLANDS, Mindanao, Davao, Todaya, Mount Apo, alt. 750—1100 m: ELMER 10553 (H, L, NY), flow. in May 1909; ID. 10660 (*Type specimen of Discocalyx macrocarpa*, H, L, NY), flow. in May 1909; ID. 11867 (H, L, NY), fr. in Sept. 1909.

Remarks: Laticiferous trees with spreading branches, up to 27 m high (with a bole of 17 m) and 0.53 cm in diam., with white abundant latex, growing apparently scattered in open or dense jungle, second growth forests and old forests at 300—600′ in British Malaya, at 500—1000 m in Sumatra, at 1500 m on Mt. Kinabalu in British North

Borneo, at 750—1100 m in Mindanao, at 600 m in Ternate and at 1000—1100 m in Flores. Flowers pale waxy yellow- or greenish white, the petals thickish, the calyx light green, mostly in June to August (Mal. Peninsula, Sumatra), or in January (Ternate), March (Flores) or May (Mindanao). Young fruit green, in August (Mal. Penins.), January (N. Borneo), March (Flores) or September (Mindanao). Native names: *kajoe majang rata* (Asahan); *perawas samboengan* (Ml., Karo dist.); *beroe* (Karo Batak); *wowo* and *lama kamba* (Flores, Endeh); *koeriaba* (Ternate).

Rather isolated both taxonomically and geographically. The part of its disjunct area in N.E. Sumatra and S.W. Malaya suggests a post-glacial local disjunction of a formerly continuous area. It is particularly distinguished by its glabrous, i. s. dark brown leaves with auricles and scattered glandular pits.

3. **S. arboreum** (err. *arborea*) Hook.f. in Benth. and Hook., Gen. Pl. II, 1876, 655; Clarke in Hook.f., Fl. Brit. Ind. III, 1882, 535; Kurz, Journ. As. Soc. Bengal 46, II, 1877, 229; Burkill, Bot. Abor Exp., Rec. Bot. Surv. Ind. X, 2, 1925, 316; Lam, Bull. Jard. bot. Buitenz. Sér. III, Vol. 7, 1925, 250; and Vol. 8, 1926, 19 — *Celastrinea* Wallich, Cat. 1828, 9011 — *Sapotea* Griffith, Not. IV, 1851, 291 and Ic. Pl. Asiat., 1854, 501 — *Sideroxylon arboreum* Ham., Ms.

A fairly large tree, branches terete, young branches glabrous or slightly tomentose. *Stipules* about 0.3 cm long, acute, caducous, scar triangular or round. *Leaves* light brown when dried, usually opposite, oblong-elliptic or oblong-lanceolate or lanceolate, acute or cuneate at base, apex acute or acutely acuminate, (7—)11—36.5 cm long, (2—)2.9—12.8 cm broad, blade glabrous at both sides; secondary nerves 7—13, curved, starting at an angle of 50°—60° from the midrib, sometimes joined in the apex; tertiary nerves often prominent at both sides, almost parallel and very regularly arranged at an angle of 90°—95° with the midrib, usually rather straight, 0.1—0.2 cm apart; glandular pits always extant and in the nerve axils only; auricles lacking; petioles minutely tomentose, glabrescent, sulcate above, 1.2—3 cm long. *Inflorescences* minutely tomentose, glabrescent, generally broadly and laxely paniculate, 4.5—18.5 cm long, branches 1—10.5 cm long, the flowers either in fascicles, the pedicels tomentose and 0.1—0.15 cm long, or solitary on very short pedicels; bracts pubescent, deltoid, about 0.1 cm long. *Calyx* tomentose without, glabrous within, 0.2—0.3 cm long and broad, sepals rounded. *Corolla* tube 0.1 cm long, lobes ovate, 0.3 cm long and

0.25 cm broad. *Staminodes* subulate, 0.1—0.15 cm long. *Stamens* ovoid, 0.15 cm long, 0.1 cm broad. *Pistillum* glabrous, 0.25 cm long and 0.15 cm broad, style stout, about 0.1 cm long, hardly exsert, ovary 2-celled. *Fruit* ellipsoid or oblong, about 2.5 cm long and 1—1.5 cm in diam., 1-seeded; pedicel about 0.3 cm, sepals reflexed. *Seed* about 2.3 × 1.3 cm.

INDIA, Sikkim, Darjeeling, Badamtam, 7000′ alt.: J. S. GAMBLE 7491 (K), flow. in Dec. 1879; Terai: ID. 28009 (K) — Kulyat-Koong (loc.?, nat. name?), alt. 4000′: ID. 2300 A (K), big tree, fr. June 1874 — Dumsong: G. KING s.n. (K) — Loc. unknown: THOMSON s.n. (L); lower hills, alt. 3—5000′: J. D. H. 280 (K); outer hills, lat. 3—5000′: ID. 279 (K); alt. 3—5000′: ID. s.n. (K, L); without any indications: ID. s.n. (B, H, K, L) — Bengal, East Bengal, Kalimpong, alt. 4000′: H. H. HAINES 1061 (K), flow. in Febr. 1905 — Buxa Reserve: J. S. GAMBLE 6678A (K), flow. 6. 2. 1879 — Loc. unknown: GRIFFITH 3603 (B, H, NY, P) — Assam, Khasia Hills, alt. 2000′: J. D. H. & T. T. s.n. (H, K, NY, P); ID. 2476 (K), bushy tree, flow. Oct. 1850; SIMONS 104, flow. Febr. 1850 (K); GRIFFITH s.n. (K); NAT. COLL. Bot. Gard. Calc. s.n. (L, P) — Manipur, Kala Naga Hills, alt. 4000′: G. WATT 7276 (K), flow. in May 1882; Sakok, alt. 5000′: A. MEEBOLD 7176 (B, K), a small tree among *Quercus*, flow. in Dec. 1907 — Laimetak Hills, alt. 1500′: C. B. CLARKE 42136 (B), flow. 28. 11. 1885 — Lushai Hills, Aijal, alt. 3000′: Mrs. N. E. PARRY 624 (K), flow. in Febr. 1928 — Loc. unknown: JENKINS s.n. (L, P); GRIFFITH s.n. (herb. A. Gray) (NY, P); WALLICH 9011 (*Type specimen*, K).

BURMA, Upper Burma, Kachin Hills: SHAIK MOKIM s.n. (H), flow. in June 1898 — Bhamo, on hills, alt. 5000′: MONTAGUE HILL s.n. (K), a large tree, flow. yellow — Namyoon (teste KURZ, l.c.) — Loc. unknown, 1000′ alt.: SMALES s.n. (K), flow. in Febr. 1902 — Southern Shan States, W. Thitsidaung, Loilong, alt. over 2000′: W. A. ROBERTSON 104 (K), tree 30′ high, flow. in Jan. 1910; Keng Tung Territory, between Pang Sop Lao and Bang Yang Kha, valley of Meh Len, alt. 660—930 m: J. F. ROCK 2178 (H, W), tree, leaves leathery, flowers yellow, 29. 1. 1932 — Loc. unknown, in forest: C. E. PARKINSON 4969 (K).

SIAM, Chiengmai Prov., Kun Awn, in oak jungle, alt. 1200 m: A. F. G. KERR 4740 (K), tree about 7—8 m high, flow. yellowish on 31. 1. 1921, scented, juice milky; Muang Ha, in mixed forest by stream, alt. 500 m: ID. 6384 (K, P), tree with milky juice, about 20 m high, flow. buds on 18. 10. 1922; Doi Sutep, in evergreen jungle, alt. 750 m: ID. 3497 (K, P), tree about 6—7 m high, flow., 1. 1. 1915; evergreen jungle, alt. 3000′: ID. 2599 (K), tree; Doi Chiengdao, alt. 2200′: ID. 2858 (K), tree about 40′ high, flow. pale green on 27. 1. 1913 — Pa Mieng, Chê Sawn, in evergreen jungle, alt. 1100 m: A. F. G. KERR 3107 (K), tree 15—18 m high, flow., 19. 1. 1914, inflorescences with galls.

CHINA, S.E. Tibet, Abor Hills (teste BURKILL l.c.) — Yunnan (Sen), Lofou, Kouy Tcheou, J. CAVALERIE 3508 (K), flowers yellowish-green, 1. 4. 1909; Szemeo, West mountains, alt. 4500′: A. HENRY 12837A (H, K, L, NY, W), tree 15′ high, flowers yellow in Jan. 1915: ID. 12191 (NY), tree 30′, fr. in May; Yuanchiang, alt. 4500′: ID. 11588 (H, NY), tree 15′, flow. yellow; Muang Hun and Muang Hai, in evergreen forest: J. F. ROCK 2396 (H, W), tree 60—70′ high, flow. waxy yellow, very fragrant, 13. 2. 1922: same loc.: G. FORREST 9683 (H, K) — Kwangsi, loc. unknown: R. C. CHING 7708 (Ca, NY), young flow. buds, 27. 9. 1928; CHINESE COLL. 461, fruit 24. 5. 1916.

LOCALITY UNKNOWN, in very heavy wood, alt. 3500′: J. S. GAMBLE 630 A (K), big tree, used for canoes, leaves used to feed cattle, fr., 5. 5. 1876.

Remarks: A tree with milky juice, up to 21 m high, growing in evergreen jungle, in mixed woods and in *Quercus* woods at an altitude of 1000—7000′. Flowers pale green or yellowish or usually waxy yellow, fragrant, mostly in (October—)November to January(—February) (Sikkim, Assam, Burma, Siam, E. Bengal), or in February to April (China); fruit in May and June.

Distinguished by its large glabrous leaves with conspicuous pits in the nerve axils, by its minutely tomentose inflorescences with comparatively large flowers and by the absence of auricles. It is closely related to *S. kachinense,* from which it may be distinguished by the absence of auricles, by its glabrous leaves with much longer petioles and by the glandular pits in the nerve axils; to *S. Uittienii,* from which it differs by the glandular pits, the glabrous leaves and the 2-celled ovary; and to *S. Griffithii,* from which it is different by its glandular pits, its pubescent inflorescences and its broader leaves.

4. **S. Uittienii** H. J. LAM, Bull. Jard. bot. Buitenz. Sér. III, Vol. 8, 1926, 19, *fig. 1.* — *S. sumatranum* UITTIEN, nomen in Herb. Rheno-Traj.

Tree?. Branches terete, tomentose, glabrescent. *Stipules* subulate, tomentose, 0.5—0.8 cm long, caducous. *Leaves* fairly opposite, light brown when dried, oblong-elliptic to ovate or obovate, narrowing into an acuminate apex and base, 10—25.5 cm long, 4.5—9.5 cm broad, glabrous above, sparsely pubescent below, glabrescent; secondary nerves 8—16, slender but prominent, slightly curved or straight, starting at an angle of 50°—60° from the midrib, diminishing near the margin, sometimes archingly joined in the apex; tertiary nerves hardly conspicuous, not very much crowded, rather regularly arranged, at an angle of 105°—110° with the midrib, 0.1—0.3 cm apart, slightly sigmoidly curved; glandular pits none; auricles none; petioles minutely tomentose, 1.2—2 cm long. *Inflorescences* densely but minutely tomentose, generally broadly and laxely paniculate, sometimes almost unbranched, 3.7—13.3 cm long, branches 1.5—6.7 cm long; bracts tomentose, deltoid, 0.1—0.2 cm long; flowers in fascicles or solitary, pedicels 0.2—0.4 cm long. *Calyx* densely tomentose without, glabrous within, 0.25 cm long and 0.2 cm broad. *Corolla* tube in bud 0.05 cm long, lobes obovate, 0.2—0.25 cm long. *Staminodes* deltoid, 0.05 cm long and 0.03 cm broad (in bud). *Stamens* ovoid, 0.1 cm long and broad. *Pistillum* glabrous, about 0.25 cm long and 0.15 cm broad, style 0.1 cm long, ovary 1-celled. *Fruit* unknown.

SUMATRA, Sum. East Coast, Hoch Angkola: JUNGHUHN 543 (L); same loc.?: JUNGHUHN 231 (L); Asahan, Aek Moente (Aer Moette), N.E. of Tomoean Dolok, West of Salabat, alt. 500 m: RAHMAT SI BOEEA (BARTLETT) 9312 (H), native name: *kajoe sori baja,* flow. 15 June—9 July 1936 — Locality unknown: COLL.? s.n. (*Type specimen* ex herb. Miq. in Herb. Utrecht).

Remarks: Closely related to *S. kachinense,* from which it differs by the absence of auricles and of glandular pits, by its minute indumentum and by its 1-celled ovary; and to *S. arboreum,* from which it differs by the absence of glandular pits, by its more or less pubescent leaves, by its 1-celled ovary and by its longer pedicels.

5. **S. laurinum** (err. *laurina*) HOOK.F. in BENTH. and HOOK., Gen. Pl. II, 1876, 655; HEMSLEY, Journ. Linn. Soc. XXVI, 1889, 68; LAM, Bull. Jard. bot. Buitenz., Sér. III, Vol. 7, 1925, 269, and Vol. 8, 1926, 19 — *Reptonia laurina* BENTH., Fl. Hongkong, 1861, 208.

Shrubs or trees, branches terete, glabrous. *Stipules* acute, 0.5—0.8 cm long, caducous, scars triangular or round. *Leaves* irregularly arranged, alternate, subopposite or in whorls of 3 or 4 (especially at the tips of the branchlets), pale brown when dried, spathulate or obovate-lanceolate to lanceolate, bluntly acute or acuminate at apex, narrowly cuneate at base and usually pretty gradually narrowing into the petiole, (3.7—)7.2—17.5 cm long, (1—)1.6—5.6 cm broad, blade glabrous at both sides; secondary nerves 5—10, not prominent, slightly curved, starting at an angle of (25°—)40°—50° from the midrib, not joined near the margin, except sometimes in the apex; tertiary nerves almost inconspicuous at either side, not very much crowded, almost parallel and regularly arranged at an angle of about 90° with the midrib, 0.1—0.25 cm apart, rather straight; glandular pits, if any, in the axils of the apical nerves only; auricles none; petioles glabrous, sulcate above, (0.5—)0.7—2.2 cm long. *Inflorescences* glabrous or slightly tomentose, either racemose, 1.5—10(—17.5) cm long, the pedicels 0.05—0.2 cm long, or paniculate and branched at the base, 5.5—12.5 cm long, the branches, 1—6 cm long, pedicels 0.2—0.3 cm long, bracts more or less pubescent, deltoid, about 0.15 cm long and broad; flowers solitary or in few-florous fascicles. *Calyx* glabrous or slightly tomentose without with rounded sepals, glabrescent, glabrous within, 0.15—0.25 cm long, 0.2—0.3 cm broad. *Corolla* tube 0.1 cm long, lobes rounded, about 0.2 cm long and broad. *Staminodes* subulate, 0.075 cm long. *Stamens* 0.04 cm long and broad. *Pistillum* glabrous, 0.2 cm long and 0.15 cm broad, style 0.05 cm long, ovary 1-celled. *Fruit* ellipsoid or oblong, 1.7—2.3 cm long, 0.8—1.1 cm in diam., 1-seeded, sepals reflexed; pedicels 0.2—0.3 cm long. *Seed* 1.7 cm long and 0.85 cm in diam., the scar 0.35 cm in diam.

CHINA, Kwangtung, Hainan, Yaichow, in woods, alt. 2000′: F. C. How 70332 (H, NY), tree 14 m high, fruit green, March—July 1933; in mixed woods, dense shade: H. Y. Liang 63202 (NY), tree, 6—8 m high, flowers green-white, still closed on 13. 10. 1933; id. on mountain top: Id. 63290 (NY), tree 10 m or more high, flow. on 16. 10. 1933; between Paai Poon Ts'uen and Fan Maan Ts'uen, growing in sandy ravine: H. Fung 20062 (H, NY), woody, 7 m high, 30 cm in diam., fruit red, turning black when ripe, nat. n. (?): *chai chi sik,* April—May 1932; Mo San Leng, in forest, alt. 3000′: N. K. Chun and C. L. Tso 44330 (H, NY), tree, 10 m high, 40 cm in diam., flowers creamy white, fragrant in Nov. 1932; Sha Po Shan, Tan-hsien Dist., in big ravine: Tsang Wai Tak 769 (B, NY, W), 10′ high, flow. and green fruit on 3. 9. 1927; Nam Fung, Hong Ma Ts'uen, ravine, alt. 350 m: F. A. McClure 8301 (H, K), tree, 7 m high, 12 cm in diam., flowers yellowish, fragrant, on 2. 12. 1921; Po-ting, in forest, alt. about 700′: F. C. How 71895 (H), shrub 3 m, leaves lustrous green above, pale green below, fruit when young pale green, when matured red, 14. 4. 1935; along stream: C. Wang 36446 (H, NY), tree 15 m high, flowers green on 12. 1. 1934; Id. 34308 (H, NY), tree 10 m high, flower buds green, on 27. 9. 1933; in mixed forests: Id. 36544 (NY), tree 20 m high, young fr., 13. 1. 1934; in mixed and shaded forest along margin of stream: H. Y. Liang 63792 (NY), tree 15 m or more high, 2—3 m (dm?, ft?) in diam. (girth?), flow. green, 26. 10. 1933; same habitat, top of mountain: Id. 63380 (NY), tree 11 m high, 1.33 m (dm?, ft?) in diam. (girth?), flow. 4. 10. 1933; Id. 63373 (NY), tree 10 m high, flow. green-white, 4. 10. 1933 — Ting Wu (Hu) Shan: T. N. Liou 7583 (NY); in partial shade, side of trail: Tsiang Ying 1519 (H), tree 40′, flow. 6. 11. 1928; back of temple: Id. 1518 (H), flow. 6. 11. 1928; C. O. Levine 2004 (H), fr. and flow. buds on 26. 5. 1918; Id. 3116 (H), flow. buds on 22. 9. 1918; in dense woods: W. Y. Chun 6381 (H), tree 6 m high, bark gray brown, branches green, becoming gray brown, fruit purplish red, succulent, tawny black, leaves deep lustrous green above, deep green beneath, 5. 5. 1928; West River: C. Ford 9 (K), used by priests as a charm, 6. 5. 1882 — Lo Fou Shan, Chong Shu Kwan, East River, in dense mixed woods: Tsiang Ying 1710 (H, K, NY), tree 10 m high, flow. on 23. 12. 1928; Id. 1678 (H), tree 10 m high, flow. 21. 12. 1928; Pok-lo District, alt. 4100′: T. M. Tsui 91 (NY); Ng Tung Shan, San-on dist., mountain forest, alt. 3080′: Id. 226 (NY), woody, 4′ high, 1″ diam. on breast height, fr. green and red in April 1932; C. O. Levine 702 (H), ster. 5. 7. 1917 — Hong Kong: Harland 753 (*Type specimen*, K); W. J. Brigham s.n. (H); Bot. Gard.: C. Ford 21 (K), fr. on 10. 4. 1880; Happy Valley: Id. 10 (K), a small tree, fr. on 23. 4. 1879; Id. s.n. (H, NY), flow. 1879; C. S. Sargent s.n. (H), flow. on 5. 11. 1903; Peak: Tsiang Ying 344 (H), fr. on 23. 4. 1928; Lantao: Dunn 8266 (H), fr. on 16. 3. 1909; Wu (U) Kan Tin: W. Y. Chun 6208 (H), fr. 2. 4. 1928; Coll.? 10222 (H), fr. 22. 4. 1913 — Kwangsi, Tan Ngok Shan, along Kwantung border, nr. Tung Chung, Waitsap Dist., dry silt, sandy soil: Tsang W. T. 23270 (H), woody, 9′ high, flow. light yellow, odourless, 24. 11. 1933; Seh-Feng Dar Shan, S. Nanning, in wood, in ravines, 2000′ alt., common: R. C. Ching 8126 (H, NY, W), tree 60′, 1′ in diam., branches dense, dark gray, bark gray, leaves thick, crisp, dark shining green above, light green below, flowers: petals spreading, sepals green, 22. 10. 1928; Id. 8278 (H, NY, W), tree 60′ high, 1′ in diam., bark gray, shoot smoky green, flow. yellow, scented, 28. 10. 1928; alt. 2500′: Id. 8076 (H, NY, W), tree 30′ high, 10″ in diam., bark gray, leaves thick leathery, dark shining green above, light green below, flow. buds on 21. 10. 1928; alt. 1200′: Id. 7882 (H, NY, W), tree 30′ high, 1′ in diam., flow. creamy yellow, 15. 10. 1928; ID. 7851 (NY), tree 30′ high, 10″ in diam., bark dark gray, branches green, flow. creamy yellow, 15. 10. 1928 — Fu Kien, Eng Hok Hsien: H. H. CHUNG 1351 (H, K), tree 10 m high, young fr. on 5. 4. 1923; Inghok, Fang Quang Yen: ID. 7744 (H, NY), fr. 9. 5. 1928; Foochow: O. WARBURG 5798 (H, K), A° 1887 — Che Kiang, Ning-po Mts.: E. FABER s.n. (K), flow. in Aug. 1885; ID. 285 (W) — Locality unknown: W. Y. CHUN 5229 (H).

Remarks: A shrub or tree, 1.2—20 m high, 0.025—0.40 m in diam., growing in dense woods both on mountain tops and in ravines, usually in dense shade, at altitudes between 1150 and 4100′; bark gray or gray brown, the branches green, afterwards gray brown or dark gray, leaves thick and crisp, leathery, dark shining green above, pale green below; flowers greenish or yellowish white or cream-coloured, usually fragrant, with green calyx and spreading petals, main blooming time in October and November, but also found flowering in August (Che Kiang), September (Hainan, Ting Wu Shan), December (Hainan, Lo Fou Shan) and January (Hainan). Fruit green when young, red to purple and black when ripe, main fruiting time in April to May.

Fairly isolated both taxonomically and geographically. The species is particularly distinguished by its relatively small, irregularly arranged, coriaceous, glabrous and oblanceolate leaves with (if any) the glandular pits restricted to the apical nerve axils, with narrowly cuneate base and without auricles and with only 5—10 secondary nerves, and by its 1-celled ovary.

6. **S. Griffithii** HOOK.F. in BENTH. and HOOK., Gen. Pl. II, 1876, 655; CLARKE in HOOK.F., Fl. Brit. Ind. III, 1882, 536; LAM, Bull. Jard. bot. Buitenzorg, Sér. III, Vol. 7, 1925, 250 and Vol. 8, 1926, 19.

A large tree, branches terete, glabrous. *Stipules* glabrous, lanceolate-acuminate, with a black central stripe, about 0.2 cm long, caducous, scars triangular. *Leaves* more or less light brown when dried, usually opposite, oblong-lanceolate or ovate-lanceolate, apex rather gradually and acutely acuminate and often curved, acute at base, 5.5—20 cm long, 1.5—5.5 cm broad, glabrous at both sides; secondary nerves 6—9, not prominent, curved, especially in the apex, starting from the midrib at an angle of 50°—55°, diminishing and not joined near the margin; tertiary nerves not prominent above, 0.05—0.25 cm apart, almost inconspicuous below, not very much crowded, more or less irregular and undulate, at an angle of 90° with the midrib; glandular pits none or very rare; auricles none; petioles glabrous, sulcate above, 0.4—1.3 cm long. *Inflorescences* glabrous, paniculate, 3.2—

6.8 cm long, branches 1—4.5 cm long, flowers in fascicles, pedicels slender 0.1—0.2 cm long, bracts glabrous, subulate or acute, 0.1—0.15 cm long. *Calyx* glabrous, 0.15—0.2 cm long and 0.25—0.3 cm broad. *Corolla* tube 0.05 cm long, lobes ovate, 0.2 cm long and broad. *Staminodes* subulate, 0.1 cm long. *Stamens* deltoid, 0.1 cm long and 0.05 cm broad. *Pistillum* glabrous, about 0.25 cm long and 0.1 cm broad, style 0.1 cm long, ovary 2-celled. *Fruit* unknown.

INDIA, Bengal, East Bengal: GRIFFITH 3602 (*Type specimen*, B, K, P) — Assam, Mausmai (locality?): C. B. CLARKE 14385 (K), flow. on 11. 12. 1871 — Khasia Hills: GRIFFITH 324 (H, K); ID. s.n. (L); NAT. COLL. Bot. Gard. Calc. s.n. (H, L); 3—4000′: J. D. H. & T. T. (K), flow. buds on 29. 9. 1850; 3—5000′: ID. (K), flow. on 30. 11. 1850; 4—6000′: ID. (B, H, L, NY, P) — Loc. unknown: MASTERS (K); KING's collector s.n. (B, H).

Remarks: Habit and habitat insufficiently known, growing in hilly country between 3000 and 6000′. Flowers apparently in November and December.

Closely related to *S. arboreum,* from which it is distinguished by the absence of glandular pits, smaller leaves with fewer secondary nerves and often curved tips, and glabrous and smaller inflorescences.

Excluded species:

S. pedunculatum(-a) HEMSLEY, Journ. Linn. Soc. Bot. 26, 1889, 68; LAM, Bull. Jard. bot. Buitenzorg, Sér. III, Vol. 8, 1926, 19 (not E. D. MERRILL, Lingnan Sci. Journ. 13, 1934, 66 = *S. kachinense*).

The type specimen (C. FORD 246, K), and several other specimens (CANTON CHRIST. COLL. [TO & TSANG] 12855, H, P, W [=*Sarcosperma pedunculatum* HANCE, nomen?]; R. C. CHING 5316 and 5353, H; W. Y. CHUN 498, H; POILANE 16477, H; according to an annotation by E. D. MERRILL possibly also POILANE 2540, which number we did not see) undoubtedly represent a Sapotaceous species, probably a *Sideroxylon.*

S. tonkinense(-sis) H. LECOMTE, Bull. Mus. Nat. Hist. Nat. Par. 24, 1918, 534, and in Flore Gén. Indo-Chine III, 7, 1930, 914.

The type specimen (BON 3974, P) consists of two sheets, bearing a few immature or sterile fruits and no flowers. As the leaves are fully alternate, without auricles or glandular pits and with a venation that is different from the usual *Sarcosperma*-type, we hardly doubt to suggest that this species does not belong to this genus. The tertiary venation superficially certainly recalls somewhat that of *Sarcosperma,* since it runs perpendicular to the midrib, but it is much more minute and more crowded than in any *Sarcosperma* species, which are pretty uniformous regarding this feature. Flowers and seeds are thusfar unknown. We don't consider it probable either that the specimens are Sapotaceous.

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(Numbers indicate the number of the species; synonyms in italics).

Apoia macrocarpa (Elm.) Merr. = 2
Bracea paniculata King = 2
Celastrinea Wall. = 3
Combretum kachinense King & Prain = 1
Discocalyx macrocarpa Elm. = 2
Reptonia laurina Benth. = 5
Sapotea Griff. = 3
Sarcosperma Hook.f.
  arboreum Hook.f. (3)
  breviracemosum H. J. Lam = 2
  caudatum Merr. = 1
  Griffithii Hook.f. (6)
  kachinense Cowan = 1
  kachinense (King & Prain) Exell (1)
  laurinum Hook.f. (5)
  paniculatum (King) Stapf & King (2)
  pedunculatum Hemsl. = Sapotacea
  siamense Fletch. = 1
  sumatranum Uittien = 4
  tonkinense H. Lec. = non Sarcospermatacea!; non Sapotacea?
  Uittienii H. J. Lam (4)
Sideroxylon arboreum Ham. = 3

Collectors' Numbers

Bartlett, v. Rahmat si Boeea — Beguin: 1325 (2) — Brigham, W. J.: s.n. (5) — Cavalerie, J.: 3508 (3) — Chinese coll.: 461 (3) — Ching, R. C.: 7708 (3), 7851 (5), 7882 (5), 8076 (5), 8126 (5), 8278 (5) — Chun, N. K. (and C. L. Tso): 44330 (5) — Chun, W. Y.: 5229 (5), 6208 (5), 6381 (5) — Chung, H. H.: 1351 (5), 7744 (5) — Clarke, C. B.: 14385 (6), 42136 (3) — Clemens, J. & M. S.: 51286 (2) — Coll.?: 10222 (5) — Dunn: 8266 (5) — Elmer: 10553 (2), 10660 (2), 11867 (2) — Faber, E.: 285 (5), s.n. (5) — Ford, C.: 9 (5), 10 (5), 21 (5), s.n. (5) — Forest Research Institute bb. numbers: 8232 (2), 8234 (2), 8600 (2), 11981 (2) — Forrest, G.: 9683 (3) — Fung, H.: 20062 (5), 20109 (1) — Gamble, J. S.: 630 A (3), 2300 A (3), 6678 A (3), 7491 (3), 28009 (3) — Griffith: 324 (6), 3602 (6), 3603 (3), s.n. (Assam) (3), s.n. (Khasia) (6), s.n. (Sikkim) (3) — Haines, H. H.: 1061 (3) — Harland: 753 (5) — Henry, A.: 11424 (1), 11588 (3), 12017 (1), 12191 (3), 12768 (1), 12837 A (3), 13291 (1), 13307 (1) — Hill, Montague: s.n. (3) — J. D. H(ooker): 279 (3), 280 (3), s.n. (2 ×) (3) — J. D. H(ooker) & T. T(homson): 2476 (3), s.n. (3), s.n. (6) — How, F. C.: 70332 (5), 71895 (5) —

Jenkins: s.n. (3) — Junghuhn: 231 (4), 543 (4) — Kerr, A. F. G.: 2599 (3), 2858 (3), 3107 (3), 3497 (3), 4740 (3), 5027 (1), 6384 (3) — King, G.: s.n. (3) — King's Collector: 7970 (2), 8086 (2), 10284 (2), 10554 (2), 10835 (2), s.n. (6) — Levine, C. O.: 702 (5), 2004 (5), 3116 (5) — Liang, H. Y.: 63202 (5), 63290 (5), 63373 (5), 63380 (5), 63792 (5), 64059 (1), 67431 (1) — Liou, T. N.: 7583 (5) — Lörzing, J. A.: 10159 (2) — Masters: s.n. (6) — McClure, F. A.: 8301 (5), 9331 (1) — Meebold, A.: 7176 (3) — Nat. Coll. Calcutta: s.n. (3), s.n. (6) — Parkinson, C. E.: 4969 (3) — Parry, N. E.: 624 (3) — Rahmat si Boeea: 6878 (2), 9312 (4) — Robertson, W. A.: 104 (3) — Rock, J. F.: 2178 (3), 2396 (3) — Sargent, C. S.: s.n. (5) — Scortechini: s.n. (2) — Shaik Mokim: s.n. (3) — Simons: 104 (3) — Smales: s.n. (3) — Thomson: s.n. (3) — Toppin: 4271 (1) — Tsang W(ai) T(ak): 769 (5), 23270 (5) — Tsiang Ying: 344 (5), 1518 (5), 1519 (5), 1678 (5), 1710 (5) — Tsui, T. M.: 91 (5), 226 (5) — Wallich: 9011 (3) — Wang, C.: 34308 (5), 35214 (1), 36446 (5), 36544 (5) — Warburg, O.: 5798 (5) — Ward, F. Kingdon: 9054 (1), 10199 (1) — Watt, G.: 7276 (3).

MISCELLANEOUS AND BIBLIOGRAPHICAL NOTES

Faradaya chrysoclada K. Schum., a synonym of Deplanchea tetraphylla (R. Br.) ~~v. Steenis~~. F. v. M.

Referring to the identification of Brass 5219 from Papua as a representative of the Verbenaceous *Faradaya chrysoclada* K. Schum. by E. Beer and H. J. Lam (Blumea 2, 1936, 225), Dr C. G. G. J. van Steenis, the monographer of the Malaysian Bignoniaceae drew our attention to the possibility that this identification might be incorrect. It was suggested that the specimen and also all specimens hitherto known as *Faradaya chrysoclada* might be Bignoniaceous and might belong to *Deplanchea tetraphylla* (R. Br.) v. Steenis, as all other *Faradayas* known are lianas, whereas *F. chrysoclada* was reported to possess the tree habit, as the *Deplancheas*.

We therefore asked on loan the materials of both species from the Herbarea at Berlin (B) and Kew (K), that from Berlin including the type specimen of *Faradaya chrysoclada*. Our thanks are due to the directors of the Herbaria of Berlin and Kew for kindly lending us the material desired.

Dr van Steenis' suggestion proved to be correct, as was shown by an investigation of the ovary which is bilocular with two multi-ovulate placentae in either cell. It further appeared that all materials from the Herbaria mentioned, as well as those from the National Herbarium, Leiden (L), hitherto preserved under the name *Faradaya chrysoclada*, actually belong to *Deplanchea tetraphylla*. The former name is therefore to be considered as a synonym to the latter:

Deplanchea tetraphylla (R. Br.) F. v. Muell., Sec. Syst. Cens. Austr. Pl. 1, 1889, 167; Van Steenis, Rec. Trav. bot. néerl., 1927, 916; and Bull. Jard. bot. Buitenz. Sér. III, Vol. 10, 1928, 220 — *Diplanthera tetraphylla* R. Br., Prodr. 1810, 448. — *Faradaya chrysoclada* K. Schum. u. Lauterbach, Fl. D. Schutzgeb. Südsee, Nachtr. 1905, 370; H. J. Lam, Verb. Mal. Arch., 1919, 234 and in Bull. Jard bot. Buitenz. Sér. III, Vol. 3, 1921, 72; E. Beer & H. J. Lam, Blumea 2, 1936, 225.

The following is an enumeration of the specimens checked:

New Guinea, Papua: Astrolabe Range, F. H. Brown s.n. (*Type specimen, Far. chrys.*, B); Mafulu, Brass 5219 (L); Koitaki, Carr 12751 (L) — S. Dutch New Guinea: Branderhorst 38 (L).

Thursday Isl.: Jaheri s.n. (L).

Australia, Queensland: Rockingham Bay, F. v. Mueller s.n. (B, K) and Herb. Th. Bernhardi s.n. (B); Cape York, Damel s.n. (K) and J. Mac Gillavry 419 (K); Fitzroy Isl., W. Hill 122 (K).

H. J. LAM and A. D. J. MEEUSE.

Manual of Pteridology, edited by Fr. Verdoorn, The Hague, Martinus Nijhoff, 1938, I—XX, 1—640, 121 ill.

The remarkable young benefactor of botanical specialists, Dr Frans Verdoorn, to whose initiative we owe such valuable periodicals as "*Chronica Botanica*" and other well-edited series of publications, has enriched our professional book-shelves with another specimen of his wonderful organizatory capacities. It must be stated, and with satisfaction and admiration, that the Editor of this new book knows how to choose his collaborators: F. O. BOWER wrote a foreword, J. C. SCHOUTE the Morphology and Anatomy (Chs I—II), GAMS the ecology of extratropical (Ch. XII) and HOLTTUM that of tropical pteridophytes (Ch. XIII); HUBERT WINKLER dealt with geography (Ch. XIV); HIRMER, KRÄUSEL, WALTON a. o. with fossils, ZIMMERMANN with phylogeny, to restrict ourselves to those items which are more particularly belonging to the scope of this journal.

Some years ago, Dr VERDOORN edited his "Manual of Bryology", to which he contributed himself. The present Manual is completing its predecessor in a most felicitous way, as the Archegoniates, and particularly the Pteridophytes, are offering numerous unsolved problems of outstanding importance for the understanding of the Spermatophytes. To SCHOUTE's elaborate and critical morphological and anatomical surveys, ZIMMERMANN's phylogeny of single organs forms an excellent counterpart, or perhaps rather an extension. However, whereas the editorial Introduction stipulates that the Manual "is not, and never could be, an exhaustive monograph", but "rather a collection of essays", one might have expected that the chapters on the fossils — so extremely important in this group — and, in general, those on Taxonomy, would have had somewhat more of the nature of essays, as they might thus have more intrinsically corresponded to SCHOUTE's and ZIMMERMANN's contributions. Maybe with the exception of the Chapters XIX. *Articulatae* (HIRMER) and XX. *Filicinae* (CHRISTENSEN), the chapters mentioned are, I think, too concise to meet a quite natural desire, roused by other chapters, for a deeper insight in the evolution of, and in the connections between the groups. This could, perhaps, have been avoided, if the taxonomy of all Pteridophytes had been surveyed by one man; but we do, of course, not know whether this was realizable. On the other hand, the two Chapters on Ecology (XII, XIII) and those on the Geography of living and of fossil Pteridophytes (XIV, XV) are splendid examples of what can be attained by the editing methods of which Dr VERDOORN is so excellent and industrious a promotor. We therefore owe to him another debt of gratitude and appreciation for supplying us with this Manual, which, moreover, presents the exquisite appearance of MARTINUS NYHOFF's famous products.

H. J. LAM.

BLUMEA

Vol. III, No. 2, blz. 203—387. 15. VI. 1939.

Uitgegeven door het } Rijksherbarium,
Published by the } Leiden, Nederland.

THE DATES OF PUBLICATION OF BLUME'S FLORA JAVAE

by

B. H. DANSER
(Botanical Laboratory of the University, Groningen, Netherlands).

The actual dates of publication of the greater part of BLUME's Flora Javae (lit. 1) appear to be unknown among taxonomists. The title-page of the first volume is dated 1828, and we find the same year at the base of the preface. The volume containing the *Orchideae* (lit. 2) is dated 1858, but further dates are absent on the work. A cover for a fascicle containing the "Planches inédites" in the Groningen University Library is dated 1829, and there are indications that no such cover ever bore a later date. Therefore, perhaps, one often finds 1828, or 1828?, or 1829 as the year of publication of the whole first series. My investigations concerning the actual dates of publication have not yet given me all the information I wished to have, but the main points seem to be now known, and to be worth publication.

In tracing literature on this subject I was considerably helped by Messrs. Dr S. BLOEMBERGEN, then in Groningen, WILLIAM T. STEARN, London, and Dr C. G. G. J. VAN STEENIS, Buitenzorg. I wish to express my best thanks to these gentlemen for the kind assistance which they gave to me.

The copy of the Flora Javae in the Groningen University Library appears to be a complete one of the coloured edition. A coloured and a non-coloured edition of the work were published at the same time, the latter at a lower price, and identical for the rest. This is evident from information given by the editors on the back page of the covers for the fascicles, and from HINRICHS' Verzeichniss (lit. 12–18).

The Groningen copy contains the following.

Vol. I. Half title, title-page dated 1828 (lit. 1), dedication to King William I of the Netherlands on 3 unnumbered pages, the preface on 10 pages numbered I—X and dated Brussels, May 15th, 1828; the

Rhizantheae on pages 1—26 (excl. the page with the familiy-name only) and plates 1—6, all double plates, plates 3, 5, and 6 uncoloured; the *Dipterocarpeae*, on pages 1—24 (incl. the page with the family-name only, as in all further families), and plates 1—6, of which 1—4 double, and all of them coloured; the *Chlorantheae* on pages 1—14 and plates 1—2, both coloured.

Vol. II. *Filices*, on pages 1—196 and plates 1—94, of which plates 18 and 81 double, and all coloured.

Vol. III. *Cupuliferae*, on pages 1—46 and plates 1—24, all coloured; *Myriceae* on pages 1—8 and plate 1, coloured; *Balsamifluae* on pages 1—12 and plates 1—2, the latter uncoloured; *Juglandeae*, on pages 1—16 and plates 1—5, the last plate uncoloured.

Vol. IV. *Magnoliaceae*, on pages 1—40 and plates 1—12, of which 9 and 10 double, and 8 and 12 uncoloured; *Anonaceae* on pages 1—108 and plates 1—53, of which 13, 14, 25, 31, 36, and 52 uncoloured.

Vol. V. *Schizandreae*, an uncoloured plate representing a landscape in Western Java, with Mt. Gedé on the background, pages 1—18 and plates 1—5, all of them coloured; *Lorantheae* on pages 1—40 and plates 1—28, of which plate 23 uncoloured.

Ser. 2, vol. I. *Orchideae*, dated 1858, with half title, plate representing a landscape in Western Java with orchid-vegetation, title-page (lit. 2), dedication to King William I of the Netherlands on 3 unnumbered pages, preface on VI pages, 162 pages of text and 66 plates.

The so-called "Planches inédites", or "Supplement", 23 detached plates without letterpress, in the cover of a fascicle dated 1829, of which 17 represent *Ericaceae*, 4 *Loranthaceae*, and 2 ferns. The plates are numbered and named as follows: I, *Rhododendron javanicum;* II, *Rh. javanicum* var. B; III, *Rh. album;* IV, *Rh. Zippelii;* V, *Rh. tubiflorum;* VI, *Rh. celebicum;* VII, *Rh. retusum;* VII, B, *Rh. elongatum* & *Rh. retusum* var. B; VII, C, *Rh. fuscum* & *Rh. salicifolium;* IX, *Amphicalyx pilosa;* XIII, *Gaultheria punctata;* XIV, *Gaultheria leucocarpa;* XV, *Gaultheria repens;* XIX, *Vaccinium varingiaefolium,* XX, *Vaccinium cuneifolium;* XXIII, *Vaccinium coriaceum;* XXIV, *Vaccinium euanthum;* XXIX, *Loranthus globiflorus* & *L. insignis* (double); XXX, *L. densiflorus;* XXXI, *L. triflorus;* XXXII, *Loranthus leptopetalus;* XCV, *Olfersia (Leptophyllum) gracilis;* XCVI, *Olfersia (Leptophyllum) aculeata.*

The way in which the fascicles are bound into volumes may, in other libraries, be different. See, *e. g.*, the Catalogue of Teyler's Foundation (lit. 20).

The result of my investigations on the actual dates of publication are comprised in the following synoptic list.

Rhizantheae	fasc. 1—2	= p. 1—26 and t. 1—6	1828
Dipterocarpeae	fasc. 7—8	= p. 1—24 and t. 1—6	1829
Chlorantheae		p. 1—14 and t. 1—2	
Filices	fasc. 3—4	= p. 1—36 and t. 1—12	1829
	fasc. 5—6	= p. 37—56 and t. 13—22	1829
	fasc. 9—10	= p. 57—84 and t. 23—26	1829
	fasc. 15—16	= p. 85—112 and t. 37—47	1829
	fasc. 25—27	= p. 113—152 and t. 48—65	1830
	fasc. 36—39	= p. 153—184 and t. 66—68	1849
	fasc. 40	= p. 185—196 and t. 89—94	1851
Cupuliferae	fasc. 11—12	= p. 1—24 and t. 1—12	1829
	fasc. 13—14	= p. 25—46 and t. 13—24	1829
Myriceae	fasc. 17—18	= p. 1—8 and t. 1	1829
Balsamifluae		p. 1—12 and t. 1—2	
Juglandeae		p. 1—16 and t. 1—5	
Magnoliaceae	fasc. 19—20	= p. 1—40 and t. 1—12	1829
Anonaceae	fasc. 21—22	= p. 1—36 and t. 1—14	1829 or 1830
	fasc. 23—24	= p. 37—56 and t. 15—27	1829 or 1830
	fasc. 28—29	= p. 57—80 and t. 28—39	1830
	fasc. 30—31	= p. 81—100 and t. 40—50	1830
	fasc. 32—33	= p. 100—108 and t. 51—53	1830
Schizandreae		p. 1—18 and t. 1—5	
Lorantheae	fasc. 34—35	= p. 1—24 and t. 1—16	1830
	fasc. 41—42	= p. 25—40 and t. 17—28	1851
Orchideae	ser. II, vol. I 1858		

"Supplement" or "Planches inédites" 1898.

For this I can put forward the following arguments.

H. C. VAN HALL tells us in 1828 (lit. 4), that in that same year fasc. 1 and 2 appeared, containing the *Rhizantheae,* on X + 24 pages and 6 double plates. VAN HALL does not mention the dedication. Page I—X are the preface, dated May 15th, 1828; pages 1—24 are not exactly the pages belonging to the plates, as there are 23 pages of text and 3 pages explanation of plates, together 26 pages. We can better accept that this is due to an inexactitude of VAN HALL's communication, than that the last two pages were published later.

Fasc. 1—2 are also reviewed in Botanische Literaturblätter (Nürnberg), I, p. 363—69 (1828), according to a communication by letter from Mr. W. T. STEARN, and in the "Leipziger Messcatalog" for the Michaelismesse of 1828 (lit. 8), where fasc. 1—2 are enumerated among the books available in Leipzig. This proves VAN HALL's communication to be correct.

Van Hall tells us in 1830 (lit. 5), that in 1829 and 1830 fasc. 3—35 appeared, each containing the plates as indicated in our synoptic list. He does not mention separately what appeared in 1829 and 1830, nor the pages of text delivered together with each fascicle. The latter may, however, be calculated approximately, as van Hall appears to consider, as a matter of course, that normally the accessory letterpress appeared together with the plates, whereas in certain cases he mentions as a peculiarity that the letterpress to the plates did not appear. Several times, moreover, he mentions names and synonyms that are not found on the plates, and this always confirms the supposition that together with the plates the accessory pages of printing were delivered. If, taking this for granted, we calculate the number of pages for fasc. 1—6, 7—16, 17—27, 28—33, and 34—35, and compare these with the number of sheets mentioned by Hinrichs for these fascicles (lit. 12–18), there appears to be a striking congruence, as will be evident from the following.

From van Hall's communications it furthermore appears that Blume used to give nearly 6 plates in each fascicle, a double plate counting as two, and that the accessory text was delivered at the same time, no matter whether this was much or little. As regards the *Loranthеae,* van Hall emphatically tells us that, in 1830, together with plates 1—16, there appeared only the text to plates 1—4. Fasc. 5—6 together contain 11 plates, fasc. 9—10 14 plates, fasc. 15—16 11 plates, fasc. 17—18 8 plates, fasc. 19—20 14 plates, fasc. 21—22 14 plates, fasc. 23—24 13 plates, if we count the double plates as two. For fasc. 30—31, two plates, 41 and 44, are not mentioned by van Hall, but this must be an error; these plates, undoubtedly, appeared together with plates 40, 42, 43, and 45—50; these two fascicles then contain 11 plates. All other fascicles contain 6 plates each. On the covers of the fascicles we read: "Chaque livraison sera composée de six figures in-folio, ou seulement de trois en format double, lesquelles seront accompagnées du texte nécessaire à leur explication".

From the foregoing it is evident that, at the end of 1830, all families had completely been published, with exception of a part of the *Filices, viz.* p. 153—196 and plates 66—94, and a part of the *Loranthеae, viz.* p. 25—40 and plates 17—28. That the last pages, as indicated in our list, are correct, is evident from Hinrichs' records cited below. A catalogue of Teyler's Foundation (lit. 20) mentioning page 1—26 to plate 1—16 must be wrong, as between p. 26 and 27 we have the middle of a sheet of printing.

That between VAN HALL's communication and the year 1847 no fascicles appeared is evident from a statement by BLUME, in Rumphia, vol. 3, p. II, where he says in the preface, dated June 1st, 1847: "Sciant autem illi, qui toties significarunt cupere se Floram Javae continuari, praeter triginta quinque fasciculos, qui antea editi fuere, hoc ipso mense fasciculos tricesimum sextum ad tricesimum nonum in lucem prodituros et sive a me ipso, sive a quovis probato librario arcessi posse".

What appeared in 1829 and what in 1830, is partly evident from HINRICHS' Verzeichniss (lit. 12–18), and a few other catalogues.

Fasc. 1—6, containing 25 sheets and 29 coloured plates, are mentioned in HINRICHS' Verzeichniss for Jan.—Jun. 1829 (lit. 12), as dated 1828—1829. Fasc. 3—6, therefore, must have appeared in 1829.

Fasc. 3—8 are mentioned in the Leipziger Messcatalog for the Ostermesse 1829 (lit. 9), and must, therefore, have appeared in 1829.

Fasc. 7—16, containing 35 pages of printing and 56 coloured plates, are mentioned in HINRICHS' Verzeichniss for Jul.—Dec. 1829 (lit. 13), and, therefore, appeared in 1829.

Fasc. 9—20 are mentioned in the Leipziger Messcatalog for the Michaelismesse 1929 (lit. 10), and, therefore, appeared in 1829.

Fasc. 21—25 are mentioned in the Leipziger Messcatalog for the Ostermesse 1830 (lit. 11), and, therefore, appeared either in 1829 or in the beginning of 1830. The record "fasc. 21—25" probably is a mistake; it has to be either fasc. 21—24 or fasc. 21—27, as, according to VAN HALL, fasc. 25 appeared together with fasc. 26 and 27.

Fasc. 17—27, containing 43 sheets, 57 coloured plates and 7 uncoloured ones, are recorded as dated 1829 in HINRICHS' Verzeichniss for Jan.—Jun. 1830 (lit. 14); these fascicles, therefore, appeared either in 1829 or 1830.

Fasc. 28—33, containing 17½ sheets, 33 coloured plates and 3 uncoloured ones, are mentioned in HINRICHS' Verzichniss for Jul.—Dec. 1830 (lit. 15), and, therefore, probably appeared in 1830.

Fasc. 34—35, containing 6 sheets and 10 coloured plates, are mentioned in HINRICHS' Verzeichniss for Jan.—Jun. 1931 (lit. 16), and, there fore, undoubtedly appeared in 1830.

Allgemeines Deutsches Bücherlexikon VIII (lit. 7), mentions fasc. 1—35 for 1828—1829. This is certainly incorrect. Probably the covers of the fascicles bore no later date than 1829, as I expressed as my opinion in the above.

The numbers of pages mentioned in our synoptic list are not indicated by VAN HALL, but have been calculated from the number of plates to which they belong. It, therefore, is important to compare them, as far as possible, with the information given about them in HINRICHS' Verzeichniss.

For fasc. 1—6 I calculate 25½ sheets of printing and 28 plates, 3 of which uncoloured, whereas HINRICHS mentions 25 sheets and 29 coloured plates. The difference in the number of sheets is unimportant, as it is difficult to say how many title pages have to be considered as text. HINRICHS mentions one plate more than our list. He certainly is wrong, however, in not mentioning the 3 uncoloured plates of fasc. 1—2.

For fasc. 7—16 I calculate 35 sheets of printing and 57 plates, all coloured, whereas HINRICHS mentions 35 sheets and 56 coloured plates; this is only one plate less.

For fasc. 17—27 I calculate 43 sheets and 65 plates, 7 of which uncoloured, whereas HINRICHS gives 43 sheets and 64 plates 7 of which uncoloured.

For fasc. 28—33 I calculate 17½ sheets of printing and 31 plates, 3 of which uncoloured, whereas HINRICHS mentions 17 sheets and 36 plates, of which 3 uncoloured. HINRICHS apparently mentions 5 coloured plates more, which is remarkable in connection with his information about fasc. 34—35.

Fasc. 34—35 are calculated by me as 6 sheets of printing and 16 coloured plates, whereas HINRICHS mentions 6 sheets and 10 coloured plates. Now it would, indeed, be remarkable if, as VAN HALL mentions, fasc. 32—33 did not contain more than 8 plates, and fasc. 34—35, on the contrary, 16 plates. It seems, therefore, not improbable that BLUME included the first few plates of the *Loranthеae* in fasc. 33. In any case, the difference between the calculated number of plates and that mentioned by VAN HALL has no influence upon the year of publication of the fascicles.

Fasc. 36—39, containing pages 153—184 and 23 plates, are mentioned in HINRICHS' Verzeichniss for Jan.—Jun. 1851 (lit. 17) as published in 1849.

Fasc. 40—42, containing pages 25—40 and 24 plates, are mentioned, in HINRICHS' Verzeichniss for Jan.—Jun. 1852 (lit. 18), as having appeared in 1851.

Allgemeines Deutsches Bücherlexikon XI (lit. 7) mentions fasc. 36—42, containing 47 plates with accessory text, as having appeared in 1849.

The last two records give several difficulties.

Allgemeines Deutsches Bücherlexikon mentions fasc. 40—42 for 1849, but this is certainly incorrect. In the Leiden Rijksherbarium there is a sheet with *Viscum articulatum*, numbered 908.182—1319, bearing a label written by MOLKENBOER, the author of the *Loranthaceae* in MIQUEL'S Plantae Junghuhnianae, and on this label we read:

"Viscum articulatum Burm. Java. ? Viscum compressum Bl. Fl. Javae tab. 26, sine descriptione; prodiït anno 1851 Maji, prodiisse auctor dicit anno 1829".

The words *"auctor dicit"* probably refer to the cover of the fascicle. From this sentence written by MOLKENBOER it is, however, sufficiently certain that not all the fascicles of the *Loranthaceae* appeared in 1849, but at least the last one in 1851.

The pages mentioned for fasc. 36—39 follow on those of fasc. 27 of the *Filices* and are certainly pages 153—184 of this family. The 23 plates mentioned as accompanying these plates undoubtedly are plates 68—88 of the *Filices.* After this, pages 185—196 and plates 89—94 of this family are still missing. Together this comprises 6 plates with accompanying text, just enough for one fascicle.

The pages mentioned by HINRICHS for fasc. 40—42 (lit. 18) are exactly the missing ones of the *Lorantheae,* and the 24 plates, accompanying them, will certainly have comprised the 6 missing plates of the *Filices* and the 12 missing ones of the *Lorantheae.* We even may suppose that fasc. 40 contained the *Filices,* fasc. 41—42 the *Lorantheae.* If this really is so, it remains a remarkable fact that HINRICHS mentions 6 plates too many and that he does not mention the last 12 pages of the *Filices.* That in the 42 fascicles there did not appear more plates than those mentioned in our list, and that the last pages of the *Filices* indeed appeared in these fascicles, is evident from a communication by VAN HALL in Tuinbouwflora 1856 (lit. 6). I cite from this (translated from the Dutch): "Of it there have appeared 42 fascicles, each of 6 plates in folio with accessory text, in which the natural families of the *Rhizantheae, Dipterocarpeae, Chlorantheae, Cupuliferae, Myriceae, Balsamiflorae, Juglandeae, Magnoliaceae, Anonaceae* and *Schizandreae* have been treated entirely, as regards our East-Indian colonies, but the *Filices* and the *Lorantheae* only partly, the work thus being suspended, at the end of the 42nd fascicle, in the middle of the description of a *Filix (Polypodium subdigitatum)*, whereas 28 plates of the Loranthaceae have been published, the descriptions of which only reach to that of the 14th plate".

This mistake in HINRICHS' Verzeichniss would not supprise us at all, if we did not find the same mistake in Allgemeines Deutsches Bücherlexikon (lit. 7). Perhaps the editors of both did not see the fascicles, but took their incorrect records from the same source.

Another indication that, after the plates cited above, no further plates either of the *Filices* or of the *Lorantheae* appeared, is the fact that the numbers of the plates of the "Planches inédites", as far as the *Lorantheae* and the *Filices* are concerned, follow on those of the last fascicles of these families mentioned in our list.

About the volume containing the Orchideae (lit. 2) I have hardly traced any literature, but there seems no reason to call the year 1858, mentioned on the title page, into question.

It is curious that a French edition (lit. 3) of this volume appeared at the same time. This is not simply a French translation. It has another title-page, on which BLUME calls himself CH. L. DE BLUME, another frontispiece, a dedication to another person, *viz.* to King William I of Wurtemberg instead of to King William I of the Netherlands, all in French, the same preface translated into French, and the same text in Latin, but in many species with an additional discussion in French, that does not occur in the Latin edition, these discussions together amounting to 28 pages. The plates are entirely the same as those of the Latin edition. In Bulletin de la Société de France IX (lit. 19), this edition is discussed on p. 50—51; it is mentioned there as having appeared in 1859—1859.

As formerly the plates called "Planches inédites" were available at Burgersdijk & Niermans' at Leiden, I asked this firm in 1929 for information about the year in which these plates were first offered for sale. They kindly informed me that they had, in 1897, bought them from Van den Hoek's, and they has offered them for sale since 1898. I therefore accept this year as the actual year of publication of the so-called Supplement.

It is not certain whether all other libraries have the same plates in the Supplement. In the Library of the Leiden Rijksherbarium the plates are entirely the same, in that of the Department of Agronomy at Buitenzorg the last two plates are missing.

In the Annales Musei Botanici Lugduno-Batavi, part I, MIQUEL has taken parts from plates I and II of the Supplement for his plate I, and parts of plates V and VI for his plate II. MIQUEL gives a short explanation of this on page 43, in a foot note to the explanation to plate I: "Icones a pictoribus, qui naturae scrutatoribus in Java adjuncti erant, ad naturam deliniatae, in Museo nostro asservantur".

The originals of the plates of the Flora Javae have never been found again in the collections of the Leiden Rijksherbarium, neither by the present director Prof. H. J. LAM, nor by his predecessor, the late Dr J. W. C. GOETHART.

Literature cited.

1. Flora Javae nec non insularum adjacentium, auctore CAROLO LUDOVICO BLUME, &c. &c., adjutore JOANNE BAPTISTA FISCHER, &c., cum tabulis lapidi aerique incisis, Bruxellis 1828. 5 vols., of which only the first with title-page.
2. Flora Javae et insularum adjacentium, nova series, scripsit CAROLUS LUDOVICUS BLUME, cum imaginibus majori ex parte naturae coloribus expressis. Tomus primus, 1858.
3. Collection des Orchidées les plus remarquables de l'Archipel Indien et du Japon, par CH. L. DE BLUME, Tome I, 1858.
4. H. C. VAN HALL, in Bijdragen tot de Natuurkundige Wetenschappen, III (1828), Boekbeschouwing, p. 278—281.
5. ——, *ibidem*, V (1830), Boekbeschouwing, p. 105—117.
6. ——, Voorstel omtrent de voortzetting van de uitgave der Flora Javae, ingediend in de gewone vergadering der Koninklijke Akademie van Wetenschappen van den 28sten Junij j.l., in Tuinbouwflora, III (1856) p. 357.
7. Allgemeines Deutsches Bücherlexikon, VIII, 1, p. 96; *ibidem*, XI, 1, p. 118.
8. Allgemeines Verzeichniss der Bücher welche in der Frankfurter und Leipziger Michaelismesse des 1828. Jahres ganz neu gedruckt oder neu aufgelegt worden sind, auch derer, die künftig herauskommen sollen; p. 308.
9. *Idem*, Ostermesse 1829, p. 22.
10. *Idem*, Michaelismesse 1829, p. 287.
11. *Idem*, Ostermesse 1830, p. 26.
12. Verzeichniss der Bücher, Landkarten &c., welche von Januar bis Juny 1829 neu erschienen oder neu aufgelegd worden sind, mit Bemerkung der Bogenzahl, der Verleger und Preise in Sächs. und Preuss. Cour., nebst andern literarischen Notizen und einer wissenschaftlichen Uebersicht; zu finden in der HINRICHSschen Buchhandlung in Leipzig; p. 23—24.
13. *Idem*, July bis December 1829, p. 18.
14. *Idem*, Januar bis Juny 1830, p. 29.
15. *Idem*, July bis December 1830, p. 22.
16. *Idem*, Januar bis Juny 1831, p. 29.
17. Verzeichniss der Bücher, Landkarten &c., welche vom Januar bis zum Juni 1851 neu erschienen oder neu aufgelegt worden sind, mit Angabe der Seitenzahl, der Verleger, der Preis im 14 Thaler-fuss, literarischen Nachweisungen und einer wissenschaftlichen Uebersicht. Herausgegeben und verlegt von der J. C. HINRICHSschen Buchhandlung in Leipzig; p. 32.
18. *Idem*, Januar bis Juni 1852, p. 34.
19. Bulletin de la Société Botanique de France, IX (1862) p. 50—51.
20. Fondation Teyler, Catalogue de la Bibliothèque, dressé par C. EKAMA, tome I. Harlem 1885—1888.

A REVISION OF THE GENUS PHACELLARIA (SANTALACEAE)

by

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(Issued June 15, 1939).

On several occasions the author received specimens for determination under the name of *Loranthaceae,* which in reality appeared to be *Phacellarias,* usually parasitic on *Loranthaceae.* When trying to name these *Phacellarias,* he preceived how difficult it was to survey the literature of the genus. Though only eight species have been described, and the authors usually have indicated the main differences between their new species and the most closely allied previous ones, the most essential characteristics of the species, *viz.,* the structures of the inflorescences, were never indicated, and a critical review of all the species has never been given. Therefore it appeared an attractive task to undertake such a revision, if only it were possible to examine all the type specimens. Through the kindness of the Directors and Keepers of the Kew and Edinburgh Botanic Gardens (K, E) and of the Paris Natural History Museum (P), the author was actually allowed to do this. Moreover he had the opportunity to study specimens of the Herbarium of the British Museum of Natural History in London (BM) and the Buitenzorg Botanic Gardens (B), whereas he discovered one specimen in Mr. A. F. G. KERR's private herbarium. The author expresses his sincere thanks to all the gentlemen who made this revision possible.

Phacellaria

BENTHAM, in BENTHAM & HOOKER FIL., Gen. pl., III, 1 (1880) 229; in HOOKER's Icones Plant., IV, 1 (1880) 17, t. 1324; HOOKER FIL., Fl. Br. Ind., V, 13 (1886) 235; HIERONYMUS, in ENGL. & PR., Nat. Pflanzenfam., III, 1 (1889) 216; COLLETT & HEMSLEY, in Journ. Linn. Soc. London, 28, no. 189—191 (1890) 122, t. 17; HEMSLEY, in Journ. Linn. Soc., bot., 31, no. 215 (1896) 308; BOERLAGE, Handl. Fl. Ned. Ind., III, 1 (1900)

175, 179; BRANDIS, Indian trees (1906) 554; LECOMTE, in Bull. Mus. Hist. Nat., Paris, 20 (1914) 399; Fl. gén. Indo-Chine, V, 3 (1915) 211; W. W. SMITH, in Not. Bot. Gard. Edinburgh, X, 49—50 (1918) 188; RIDLEY, in Journ. As. Soc., Straits Br., 82 (1920) 193; Fl. Mal. Penins., 3 (1924) 170; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71.

Herbs or undershrubs, parasitic on twigs of *Loranthoideae* and *Henslowia*, simple or branched, with scattered bract-like leaves. Flowers sessile in the axils of the bracts, either single with two lateral bracteoles (prophylls) bearing flowers in their axils or not, or with an involucre of many small bracteoles around their base and several flowers in the axils of these bracteoles, or moreover many adventitious flowers around the axillary ones, all the flowers with or without an involucre of small bracteoles; also often terminal flowers on the tips of the stems and the branches. Flowers hermaphrodite, monoecious, polygamic or dioecious. Male flower with a short perigone tube and 3—6 triangular valvate lobes; stamens equal in number to the lobes, inserted before the latter, inflexed in the bud upon a rather flat disc and somewhat impressed in its margin and upper surface, just reaching each other in the middle of the flower; filaments dorsiventrally flattened, short, attenuate from the base towards the tip; anthers cordate, with two thecae diverging towards the rounded base and converging towards the more acute tip, each of them bilocular and opening with a longitudinal slit. Female flower with an obovate to cylindrical inferior ovary, 4—8 triangular valvate perigone lobes, a flat or somewhat conical disc, and a short cylindrical style with a truncate or somewhat scutate or moreover lobed stigma. Hermaphrodite flowers like the female ones, but moreover with stamens, that are like those of the male flowers but somewhat smaller, just reaching the style with their tip when in bud, and often less in number than the periogone lobes. Ovary one-celled, but 4—6-, usually 5-celled in the apical (LECOMTE) and basal part (PIERRE), with a central columella almost reaching to the apex and bearing usually 3 (perhaps sometimes 4—5, according to PIERRE) pendulous ovules devoid of integuments. Fruit an oblong drupe, crowned by the perigone lobes and disc, with a fleshy outer layer, and a kernel that is 5-grooved, and 5-celled in the apical part, and contains a single seed, that is 5-grooved, 5-lobed at the apex, and composed of a large endosperm with a small embryo in the basal part.

The colour of the plants in the herbarium varies from light-ochraceous to ferrugineous or, in old specimens, to blackish. From the fact that most of the collectors say nothing about the colour of the living plant, and that they often indicate it as a parasite, a *Loranthacea*, or a *Viscum*, one might conclude that, in the living state, it is green. I found the colour only in two instances indicated: on the label of EVRARD's no. 934 *(Ph. tonkinensis)* it is indicated as "vert clair", on that of FARGES's no. 1511 *(Ph. Fargesii)*, as "jaune verdâtre". Moreover, the flowers of ROBERTSON's no. 2110 are indicated as "yellowish-green", those of SINGAPORE FIELD no. 23444 as "greenish white", the fruit of KLOSS's plant from Dran as "green".

The materials in the herbaria are, in the dry state, always unfit for examination or determination. If, however, one takes the trouble to soak a stem fragment with flowers in different stages of development in boiling water, he will perceive that all the essential parts regain their natural forms to such an extent that living plants, or materials preserved in alcohol, are not so indispensable as one might have at first expected.

The mode of development of inflorescences and flowers appeared to be of the utmost importance for the distinction of the species, but they were hardly ever described hitherto. Therefore I must treat them somewhat more in detail instead of only referring to the descriptions of the separate species.

In young stem tips, the bracts are very regularly arranged in a spiral (see plate VIII, 9; IX, 13, 18, 23; X, 26, 29). Later, when the stem stretches, the growth of its different parts in unequal: some bracts become far apart, others remain more or less crowded in whorls. When later the axillary flower groups become elongated by the development of more and more flowers, these whorls also may become stretched.

The most simple arrangement of the flowers in the axillary groups is found in *Ph. Fargesii* (plate VIII, 1 and 2). Here we usually find, in the axil of each bract, one single hermaphrodite flower, bearing two lateral bracteoles representing the prophylls. In some cases, we later find small flower buds in the axils of these bracteoles, but they always remain in an early stage of development. The stems, moreover, often bear one terminal, early developing flower.

Somewhat more complicated are the flower groups of *Ph. rigidula* (plate IX, 13—20). Here also we first find, in each axil, one flower with two bracteoles, but 1°, the flowers in the axils of the later reach full development, 2°, each flower bears, around its base, an involucre of a greater or smaller number of small bracteoles, and 3°, there may develop, around the first three flowers, probably in the axils of some of the involucral bracteoles, perhaps outside of them, some more flowers. In this species the male and female flowers are, as far as known hitherto, found on different stems of the same plant, and consequently the flower groups are either entirely male or entirely female. In the male groups the number of flowers is greater than in the female ones; in the latter only few fruits reach full development.

Of *Ph. caulescens* (plate IX, 21 and 22) only one female stem is known, the flower groups of which probably show the same structure as the female ones of *Ph. rigidula* in the young state; no more than one flower seems to develop, but this may also be the case in female plants of *Ph. rigidula*.

In *Ph. malayana* (pl. VIII, 3—8) the bracts first bear a single flower in their axils, which is surrounded by an involucre of numerous small bracts. Later, flowers develop in the axils of these involucral bracts and finally a roundish group of flowers is formed, inserted on a semiglobose thickening of the stem. The first flower of each group appears to be female, the others either female or hermaphrodite or male, but I never found more than one fruit in each group.

In *Ph. tonkinensis* (pl. VIII, 9—12), *Ph. gracilis* (pl. IX, 23—25), and *Ph. compressa* (pl. X, 26—33), the inflorescences are still more complicated. The first axillary flower does not bear distinct lateral prophylls, but in *Ph. gracilis* and *Ph. compressa* it is surrounded by an involucre of small bracteoles, which is absent in *Ph. tonkinensis*. All subsequent flowers seem to develop somewhere in the vicinity of the first flower, but most of them very close to it and at the bracteal side. There seems to be an intercalary growth of the stem between the bract and the first flower, for the more flowers that develop between the bract and the first flower, the larger the space becomes for them. At length the group becomes elongated and consists of numerous flowers, one of the uppermost of which is the oldest one. In *Ph. compressa* and *Ph. gracilis* all the flowers have their own involucre of more or less numerous small bracts, whereas in *Ph. tonkinensis* such involucres are entirely absent. While the flowers develop the bract shrivels, and this is has caused several authors to describe the flowers of certain species as entirely destitute of bracts.

In old stems of species with numerous flowers in each axillary group we find that many of the flowers have fallen off. The persistent involucres, which are hairy, and the separate bracteoles of which are indistinct, then often make the impression of small hollows of the stem, in which the flowers have been inserted (see plate VIII, 11; X, 28).

In *Ph. compressa* we here and there find short branches covered with imbricate bracts and bearing only a terminal flower. There is, however, only a difference of degree between these short branches and the axillary flowers surrounded by an involucre of bracteoles.

About the distribution of the sexes in *Ph. tonkinensis*, *Ph. gracilis*, and *Ph. compressa*, see these species separately.

Though the characters of the inflorescences appear to be of more importance for the delimitation of species than all further ones, yet the differences between the species are so little definable that it seems rather arbitrary how many species must be distinguished. Therefore, I have done my best to accept all the species described formerly, and not to describe any new ones, but I could not maintain this standpoint. I felt obliged to unite *Ph. compressa*, *Ph. Wattii*, and *Ph. ferruginea* to one species and to distinguish one new species.

The following species of *Phacellaria* have been described hitherto.

Ph. rigidula BENTHAM, 1880.
Ph. compressa BENTHAM, 1880.
Ph. Wattii HOOKER FIL. 1886.
Ph. caulescens COLLETT & HEMSLEY, 1890.
Ph. tonkinensis LECOMTE, 1914.
Ph. Fargesii LECOMTE, 1914.
Ph. ferruginea W. W. SMITH, 1918.
Ph. malayana RIDLEY, 1920.

BENTHAM based the genus upon two species, *Ph. rigidula* and *Ph. compressa.* As, however, he described *Ph. rigidula* first, from well preserved materials, and published it once more in the same year in HOOKER's Icones with a plate, whereas *Ph. compressa* was based on inadequate materials, we can only choose *Ph. rigidula* as the type species of the genus. It is based on GRIFFITH no. 2745 (K).

The distribution of the genus *Phacellaria* (see fig. 1) is restricted to a rather continuous area in the Southeastern part of the Asiatic Continent, extending over Southeastern China, French Indo-China, Eastern and Southern Burma, Siam, and the Malay Peninsula. It stretches away to the North as far as N.E. Sze-chuan in China (Lat. ± 32° N.), to the South as far as the State of Selangor in the Malay Peninsula (Lat. ± 3° N.). It appears to be restricted to the mountainous regions, the altitudes indicated on the herbarium labels varying from 500 m to 7500 ft above sea level.

About the derivation of the name *Phacellaria*, PILGER, *l. c.*, says: "Name von *Φχκελος* (*Φακελλος*), Bündel, Büschel; wegen der gebüschelten Blüten." BENTHAM, in his original diagnosis of the genus, does not mention fasciculate flowers, but he mentions fasciculate stems. If the derivation of *Phacellaria* from *Φακελοσ* is right, it therefore probably refers to the stems, and not to the flowers. I have also considered a derivation from *Φακοσ*, or *Φακη*, as the stems originate from the lenticels of the host plant, *Phacellaria* than meaning *lenticellaria*, but this appears less probable.

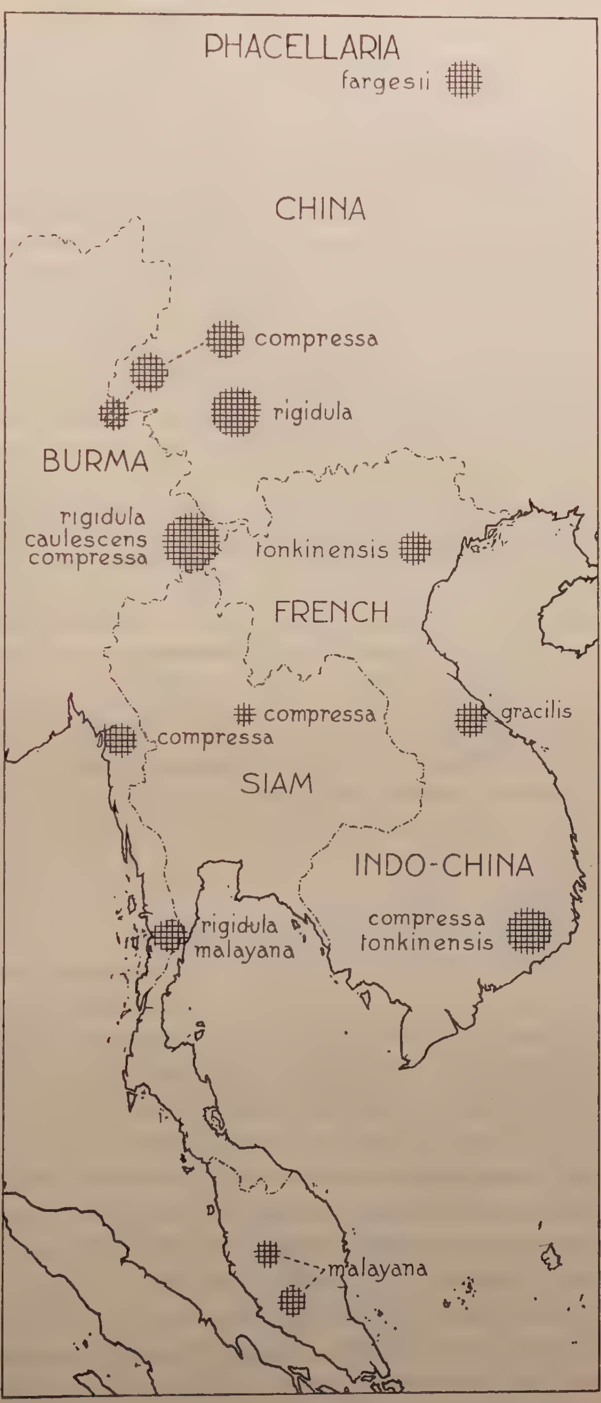

Fig. 1. Distribution of the genus *Phacellaria*, indicated by means of the approximate localities of the species.

Key to the species.

1 All flowers hermaphrodite, single in the axils or accompanied by two small, non-developing buds. Bracts over 1 mm long, recurved. Stems not over 6 cm long, not branched . . . . **1. Ph. Fargesii**

Flowers unisexual for the greater part, plants dioecious, monoecious, or polygamic . . . . , 2

2 Flower-groups finally oblong, many-flowered, the bracts shrivelling, the single flowers with or without an involucre of small bracteoles 3

Flower-groups few-flowered, or at least roundish, bracts and bracteoles distinct . . . . , 5

3 Separate flowers without involucres. Bracts small, up to 0.5 mm long. Young parts sparsely papillose-hairy, soon glabrous . . . . **5. Ph. tonkinensis**

Separate flowers with distinct involucres. Bracts usually larger . . . 2

4 Young bracts nearly 0.6 mm long. All parts entirely glabrous. Stems very slender, up to 30 cm long and usually 1—2 mm, rarely to 2.5 mm in diameter . **6. Ph. gracilis**

Young bracts up to 1 mm long. All parts rather densely velvety and somewhat hirsute in youth, more glabrous later, but rarely glabrous between the flowers. Stems more robust and not so long, rarely longer than 15 cm, usually 1—2.5, rarely to 4 mm in diameter . . . . **7. Ph. compressa**

5 Stems robust, little or not at all branched, up to 12 cm long. Flower-groups finally rather many-flowered, but roundish, on thickenings of the stem, each flower surrounded by a distinct involucre of bracteoles. Young parts velvety or even hirsute by ferrugineous hairs . . . . **4. Ph. malayana**

Stems long and slender, up to 25 cm long, little or not at all branched. Bracts and 2 prophylls of each flower-group distinct, but involucres of separate flowers indistinct or absent. Young parts papillose or somewhat velvety, soon glabrescent . . . . **2. Ph. rigidula**

Like the former, but different by more strongly branched stems, and more rounded female flowers (male flowers unknown) . . . **3. Ph. caulescens**

1. Phacellaria Fargesii LECOMTE, in Bull. Mus. Hist. Nat. Paris, 20 (1914) 401; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71.

Stems not over 6 cm long, unbranched, 2—3 mm in diameter above the base, not flattened, the young tips uneven from the beginning through the development of flower-buds, first densely and shortly velvety, later nearly glabrous; bracts rather large, 1—1.25 mm long, 0.8—1 mm wide; prophylls 2, distinct, but involucres absent. Flowers glabrous, hermaphrodite, usually single in the axils, rarely moreover as 2 small buds in the axils of the prophylls, these buds again with small prophylls, but never reaching full development; adventitious flowers absent. See plate I & VIII, 1 and 2.

Very distinct from all other species of the genus by the usually one-flowered axils and hermaphrodite flowers; from most of the species, moreover, by the short unbranched stems and the large bracts and bracteoles.

Description of the type specimens (FARGES 1511, plate I & VIII, 1 and 2):

On *Taxillus sutchuenensis*, on twigs of 5—15 mm in diameter, in smaller and larger bundles, few or many together. Stems always unbranched, 3—6 cm long, those of the same twig in the same stage of development (probably flowering only once), with obtuse ribs decurrent from the bases of the bracts, not flattened, 2—3 mm in diameter at the base, attenuate towards the extremities, which are 1.5—2 mm in diameter. Young tips uneven from the beginning through the early developing flower-buds and spreading bracts, the latter first regularly arranged in a spiral, later somewhat crowded into whorls, finally again more regularly scattered. Bracts triangular-ovate from a rounded base, abruptly shortly acuminate, nearly 1—1.25 mm long, 0.8—1 mm broad, the tip at last shrivelling and growing brown. Flowers usually single in the axils and terminal to the stems, the axillary ones with 2 distinct lateral prophylls, which are nearly 0.5 mm long, ovate-triangular, acute; later sometimes also small flower-buds in the axils of the prophylls, again bearing 2 small prophylls, but never reaching full development. Flowers as far as known all hermaphrodite, first globose in bud (never depressed), later more obovate, before opening finally campanulate-cylindrical, rounded at the base, short-conical in the apical part, nearly 2.25—2.5 mm long, 1.25—1.5 mm in diameter. Perigone lobes usually 5, more rarely 4 in number, nearly erect, 0.75 mm long and broad. Style short-cylindrical, with a slightly scutate stigma. Fruit ovate, somewhat conical, up to 6 mm long by 3.5 mm in diameter, crowned by the erect or inflexed perigone lobes. All young parts, with exception of the glabrous flower-buds, very shortly and densely ferrugineous-velvety, growing glabrous later, at length hairy only on and below the bracts.

Distribution: China, N.E. Sze-chuan, ”à Fá hañ ky-^{c} dans la sous-préfeture de Tcheñ keòu^{c} tin-^{c}“, alt 1400 m, 8 VII 1900, P. FARGES 1511 (P), ”plantes et fleurs d’un jaune verdâtre, parasite sur les Loranthus“, types of the species, flowering and fruit-bearing.

2. Phacellaria rigidula BENTHAM, in BENTHAM & HOOKER FIL., Gen. pl., III, 1 (1880) 229; in HOOKER’s Ic. pl., IV, 1 (1880) 17, tab. 1324; HOOKER FIL., Fl. Br. Ind., V, 13 (1886) 235; HIERONYMUS, in ENGL. & PR., Nat. Pflanzenfam., III, 1 (1889) 216; BOERLAGE, Handl. Fl. Ned. Ind., III, 1 (1900) 181; BRANDIS, Ind. trees (1906) 554; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71.

Stems slender, 10—25 cm long, 0.75—1.5 mm in diameter above the base, unbranched or with few branches, the tips nearly 1 mm in diameter, glabrous or somewhat papillose-hairy and then glabrescens except around the flowers; bracts rather large, ovate and acute, 0.6—1 mm long, imbricate in the beginning; prophylls distinct, involucre of 3—6 bracteoles, indistinct or later distinct. Flowers monoecious, as far as known the male and female flowers on different stems of the same plant, first in the axils of the bracts and the prophylls, later also crowded between these, forming together roundish or somewhat oblong groups on the scarcely thickened stem, the female groups with fewer flowers and finally with 1—3 fruits only. See plate II & IX, 13—20.

Nearly allied only to *Ph. caulescens,* but the latter is more strongly branched, with shorter bracts and the female flowers more roundish and single in the axils. Less closely allied to *Ph. tonkinensis,* which has smaller bracts, indistinct prophylls, no involucres, and flower-groups that finally are larger, more oblong, and with more numerous adventitious flowers. The differences with all other species are larger. *Ph. Fargesii* is a small plant with hermaphrodite flowers; *Ph. malayana* and *Ph. compressa* are more robust and more copiously hairy, and have distinct involucres around the flowers; *Ph. gracilis* has more numerous flowers in the groups and an involucre below each flower.

Description of the type specimens (GRIFFITH 2745, see plate II, 4 & 5 & IX, 13—15):

Stems on twigs of *Dendrophthoë,* probably *D. pentandra,* fascicled on the nodes of twigs of 4—8 mm diameter, and also from the lenticels of the internodes, spreading, slender and straight, up to 15 cm long, usually terete and 0.75—1.5 mm in diameter above the somewhat clavate base, gradually attenuate towards the extremities, finely grooved in the flowering portions, slightly dilated and angular below the flower groups, more strongly dilated at the insertions of the branches; branches none or few, rarely up to 5, from the lower portion of the stems divergent or incurvate, the tips terete, usually 0.5—0.75 mm in diameter. Bracts rather large, imbricate in young tips, ovate to elliptical, strongly acuminate, nearly 1 mm long including the acumen, 0.5—0.6 mm broad, convex; axillary flower and two lateral prophylls soon becoming distinct, the latter nearly half as long as the bracts and a quarter as broad, of the same shape for the rest; involucre of 3—5 bracteoles developing later, visible after the flower has fallen off, the separate bracteoles very small and roundish, acuminate or not so; first lateral flowers in the axils of the prophylls, each with an involucre of small bracteoles; further flowers developing between the axillary flower and the lateral ones, apparently not at the adaxial side of the group, finally forming together a roundish group of nearly 6 flowers on a slight thickening (especially in the male stems). Male flowers nearly globose, first somewhat higher than broad, later somewhat depressed, 4—5-merous, nearly 1.5 mm in diameter. Female flower soon more high than broad, when flowering obovate, with the perigone depressed, nearly 1.5 mm in diameter, 4—5-merous; disc somewhat conical, its height about a quarter of the diameter. Fruit not known in the adult state, oblong-prismatical, up to 4 mm long, 1.5 mm in diameter, crowned by the persistent perigone, usually single in the axils, sometimes to 2 or 3. Arrangement of the male and female flowers uncertain: between the apparently female plants one detached male stem, therefore probably male and female flowers on different branches of the same plant (as in the specimen MACGREGOR 1125).

The type specimens described are well-developed and well-preserved. They are mounted on two sheets. The first sheet (plate II, 4) is the one from which plate 1324 of HOOKER's Icones seems to be rather freely drawn; it bears the original label and drawings of details, that have been copied on the plate. These specimens are not entirely glabrous, the very young parts and also the bracts and bracteoles are papillose-velvety, even in older flower-groups. The specimens on the second sheet (plate II, 5) are in a more advanced stage and entirely glabrous, but no differences of importance with those of the first sheet could be stated.

The specimen from the Shan Hills (MACGREGOR 1125, plate II, 6 and IX, 2, 16—19) has the same indument as those from the first sheet of the types. It has several female stems and one male stem originating from the same stock. It is, moreover, remarkable for its rather high-conical discs, the height of the latter being nearly the half of the diameter, and the more numerous flowers in the male flower-groups, that also partly develop at the adaxial side of the group.

The specimens from Yunnan (HENRY 11085, plate IX, 20) are very young. They seem to be female and show only a beginning of flowering. The indument is ferrugineous and very sparse, and restricted to the inflorescences and their immediate proximity.

Distribution: China, Yunnan, "S. of Red River, from Manmei, 7000′ forest", A. HENRY 11085 (K).

Burma, S. Shan States, without locality, altitude, nor date, R. W. MACGREGOR 1125 (E), on *Dendrophthoë pentandra.* — Mergui, GRIFFITH 2745 = Herb. WIGHT 44 (K), types of the species and the genus, on *Dendrophthoë* prob. *pentandra.*

3. **Phacellaria caulescens** COLLETT & HEMSLEY, in Journ. Linn.

Soc. London, 28 (1890) 122, t. 17; BRANDIS, Indian trees (1906) 554; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71.

Slender, to 30 cm long, twice branched, to 2.5 mm in diameter above the base, the tips shortly and densely papillose or somewhat velvety, glabrescent later; bracts rather large, roundish, short-acuminate, nearly 0.6 mm long by 0.5 mm broad, first imbricate; axillary flower soon with 2 or more indistinct bracteoles. Female flowers (male ones unknown) single in the axils, globose before opening, somewhat oblong later. See plate IX, 21 and 22.

Slightly different from *Ph. rigidula* by more strongly branched stems and roundish female flowers single in the axils; perhaps only a variety of this species.

Description of the type specimen (COLLETT 736):

Insertion of the plant unknown, parasitic on *"Loranthus"* according to the label. Only stem available broken off above the base, nearly 23 cm long, with several long branches that are again branched in their apical portions, together with the branches up to 30 cm long, terete and 2.5 mm in diameter in the lower portion, somewhat angular but not flattened, and gradually attenuate towards the extremities, the tips nearly 1 mm in diameter. Bracts first imbricate, roundish, short-acuminate, nearly 0.5 mm broad and a little longer, appressed. Flowers restricted to the nearly 5 cm long apical parts, terminal and single in the axils of the bracts, with 2 (perhaps more or less than 2) indistinct bracteoles, all of them female, globose before opening, nearly 1.25 mm in diameter, later slightly longer, with 3—6 conniving triangular perigone lobes; disk rather flat, style short. Fruits ovate-oblong, up to 5 mm long, 2 mm in diameter, somewhat contracted below the persistent inflexed perigone lobes. Indument on all young parts shortly and densely papillose or somewhat velvety, later disappearing.

The plate accompanying the original description is a good drawing of the greater part of the type specimen; also the drawings of the details are very exact. Further materials of the species are unknown.

Distribution: Burma, Shan Hills, Twangan, 4000 ft alt., V 1888, COLLETT 736 (K), "parasite on Loranthus", type specimen of the species.

4. **Phacellaria malayana** RIDLEY, in Journ. As. Soc., Straits Br., 82 (1920) 193; Fl. Mal. Pen., 3 (1924) 170.

Stems short and straight, up to 12 cm long, little or not at all branched, 1—2 mm in diameter above the base, the young tips terete, densely velvety, ferrugineous; bracts first imbricate, 0.8—1 mm long, 0.6—0.8 mm broad, all flowers moreover with a distinct involucre of small bracteoles at the base. Flowers monoecious, the first of each group female, the further ones probably male, rather many together forming roundish groups on semiglobose thickenings of the stem. See plate III & VIII, 3—8.

Approaches *Ph. compressa* by its coarse stems, velvety indument, and involucres of the flowers, but the flower groups of *Ph. malayana* are roundish, the first flower of each group is female, the subsequent flowers are usually male and originate from the axils of the involucral bracts of the first flower; moreover the stems are shorter and the male flowers are less depressed.

Description of the type specimens (ROBINSON s.n., plate III, 7 & VIII, 6—8):

Stems fascicled, on the thickened nodes of 3—4 mm thick twigs of a *Loranthoidea*, perhaps *Dendrophthoë*, up to 11 cm long, unbranched or with one or two branches, terete or somewhat angular and 1—1.5 mm in diameter above the base, flattened in the apical part (perhaps by pressure) and there up to 2 or 3 mm broad, the tips again 1—1.5 mm in diameter, rarely somewhat dilated. Bracts first imbricate, roundish and short-acuminate, 0.8—1 mm long, 0.6—0.75 mm broad; first axillary flower female without distinct lateral prophylls, but with a very distinct involucre of 6—10 bracteoles, that partly are nearly as large as the bracts, partly smaller than these, and from the axils of which later 5—10 flowers take their origin; these flowers probably all of them male, never fruiting. Female flowers obovate with usually 5 erect perigone lobes, and now and then a stamen, 1.5 mm long, 1 mm wide. Male flowers smaller, less than 1 mm in diameter, nearly 0.5 mm high, 3—5-merous. Indument on the young parts rather densely hirsute-velvety, on the stems and bracts soon diminishing, persistent on the involucres of the flowers, but the flowers themselves glabrous.

This species is well-distinct from all those previously described. The type materials are in an optimal stage of development, with young and old stems, flowering and fruiting. RIDLEY described the seeds as flat (as in *Viscum*), but this undoubtedly was caused by pressure during the drying of the specimens.

The specimens from Cameron's Highlands (plate III, 9 & VIII, 6—8) are in a more advanced stage; flowers are nearly absent and the fruits have for the greater part fallen off. For the rest no differences of any importance could be stated. The specimens from Lenya (plate III, 8) are much younger, with abundant flowers in bud and a few of them open, but they too show no important differences with the type specimens.

Distribution: Burma. Mergui, Lenya, 22 II 1927, R. N. PARKER 2670 (K) "parasitic on *Loranthus*" (the host plant indeterminable).

Malay Peninsula. Pahang, Cameron's Highlands, 4500 ft alt., 5 IV 1930, SINGAPORE FIELD No. 23444 coll. HENDERSON (B), "flowers greenish white", on *Loranthacea*, probably *Macrosolen*. — Selangor, Gunong Mengkuang Lebar, 5000 ft alt., I 1913, H. C. ROBINSON s.n. (K), type of the species, on a *Loranthacea*, probably *Dendrophthoë*.

5. **Phacellaria tonkinensis** LECOMTE, in Bull. Mus. Hist. Nat., Paris, 20 (1914) 399; Fl. Indo-Chine, V, 3 (1915) 213, ic. 22; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71.

Stems long and slender, usually 15—45 cm long, 1—2.5 mm or rarely to 4 mm in diameter above the base, unbranched or with few branches, the tips rather fine, 1—1.5 mm in diameter, glabrous from the beginning; bracts small, semi-orbicular to roundish, sometimes short-acuminate, 0.3—0.5 mm long, soon remote; prophylls indistinct or none, involucres none. First flowers axillary, further flowers numerous on all sides of the first ones, at last forming oblong many-flowered flower-groups on little thickened cushions of the stems. See plate IV, 10 and 11 and VIII, 9—12.

Resembles *Ph. rigidula* and *Ph. caulescens* in general appearance, but differs from these species by the indistinct prophylls and the lack of involucres around the flowers, and the many-flowered oblong flower-groups. In the structure of the flower-groups it comes nearer to *Ph. compressa* and *Ph. gracilis*, but these have distinct involucres around the flowers.

Description of the types (BALANSA 4108, plate IV, 10 and VIII, 9—12):

On *Taxillus*, on twigs of 6—8 mm diameter; stems single or few together in fascicles, 10—20 cm long, unbranched or with a different number of irregularly arranged and long branches especially in the middle portion, that are not different from the main stem, sometimes again branched, the secondary branches very young; basal part of the stems terete, 1—2.5 mm in diameter, irregularly obtusely angular in the middle portion, often flattened to 3 mm broad, especially towards the extremities and at the insertions of the thickest branches; young tips terete or somewhat conical, obtuse, nearly 1 mm in diameter, soon becoming uneven by the development of flower-buds, with obtuse ribs below the axils. Bracts imbricate in the beginning, small, 0.3—0.4 mm long, roundish with broad base, short-acuminate, the acumen soon shrivelling, the whole bract almost disappearing at length. Flowers dioecious but not strictly so, some plants male, others male with few female or hermaphrodite flowers, others perhaps entirely female; first flower of each group in the axil of the bract, with neither prophylls nor involucre of bracteoles, soon surrounded by adventitious small depressed flower-buds, that are more numerous at the adaxial than at the bracteal side, and that at length form oblong groups up to 7 mm long by 2 mm broad on slight thickenings of the stem; no terminal flowers seen. All flower-buds depressed in the beginning, up to 1 mm in diameter, the male ones remaining so, with usually 4, more rarely 5 triangular perigone lobes, the female and hermaphrodite flowers later roundish-ellipsoidal through the development of the ovary, with usually 5, more rarely 4, perigone lobes, 1.5—2 mm long, the style short-cylindrical, the stigma truncate or slightly scutate. Fruit up to 6 mm long, 2.5 mm in diameter, broadest near the base, gradually attenuate towards the persistent perigone. Very young parts papillose-hairy, glabrescent, or later with a remainder of the indument below the bracts only; flowers entirely glabrous.

The host of the types of *Ph. tonkinensis* in a *Taxillus* near *kwantungensis*, which I cannot determine with certainty (see Bull. Jard. Bot. Buitenzorg, sér. 3, XVI, 1, p. 44—45). The types themselves are in an optimal stage of development, but they are badly broken (see Plate IV, 10).

The specimens of EVRARD 934 (plate IV, 11) are parasitic on *Scurrula gracifolia*; nearly all the stems are broken off from the host plant. They are in an advanced stage of development, 20—45 cm long, one or twice branched, nearly glabrous, with one or few fruiting flowers in each flower-group and most of the further flowers fallen off.

Distribution: French Indo-China. Tonkin, forest of Mt. Bavi, towards 1000 m alt., 28 X 1887, BALANSA 4108 (P, L), "corolle d'un blanc sale", types of the species, parasitic on a *Taxillus* near *kwantungensis*. — Annam, Dalat, 23 VI 1924, EVRARD 934 (P, L), "vert clair, aphylle", on *Scurrula gracilifolia.*

6. **Phacellaria gracilis** DANSER, n. sp.

Caules longi, graciles, ad 30 cm longi, simplices vel ramis paucis, 1—2 mm diametro supra basin, parte media saepe paulo crassiores, apicibus plerumque 1 mm, raro ad 1.5 mm diametro, ab initio glabri; bracteae ovatae, circiter 0.6 mm longae, paulum acuminatae, imbricatae, postea magis triangulares et distinctius acuminatae; flores omnes involucro distincto bracteolarum minutarum numerosarum circumdati. Flores primum singuli in axillis bractearum, postea cum multis floribus adventiciis greges oblongos planos formantes. Plate IV, 12 & IX, 23—25.

I did not see the possibility of including POILANE's no. 25403 in any of the species already described. It resembles *Ph. rigidula* and *Ph. tonkinensis* in general appearance, but from the former it differs by the many flowered flower-groups and the more strongly developed involucres of the separate flowers, from the latter by the larger bracts and likewise by the involucres of the flowers. Through the latter feature it approaches *Ph. compressa*, but this species usually has shorter and more robust stems, a more copious indument, and larger bracts. The latter differences are rather vague, but the bracts are entirely like those of *Ph. rigidula*, and not like those of *Ph. compressa*. Therefore, I even consider the possibility, that the flower-groups of *Ph. rigidula* may occasionally develop more numerous flowers, in which case the limit between *Ph. rigidula* and *Ph. gracilis* would be effaced.

Description of the types (POILANE 25403, plate IV, 12 and IX, 23—25):

On *Scurrula parasitica*, the stems originating is large numbers from twigs of 10—20 mm in diameter, and here and there singly from thinner twigs, up to 30 cm long, unbranched or with few branches in the lower portion, or with numerous short branches below the young tips, terete and 1—2 mm in diameter above the base, often thicker (up to 2.5 mm) in the middle portion, somewhat irregularly angular, the young tips terete or somewhat conical, usually 1 mm, more rarely up to 1.5 mm in diameter. Bracts first ovate to elliptical and somewhat acuminate, nearly 0.6 mm long, regularly and rather densely imbricate, shrivelling later and then more triangular and more distinctly acuminate. Flowers nearly all of them male, here and there a female or hermaphrodite one in the middle of a group; prophylls absent, but each flower with an involucre of numerous small bracteoles; first one flower in each axil, later surrounded by rather numerous (nearly 6—12) adventitious flowers originating from the stem surface, especially at the bracteal and adaxial sides, all of them with an involucre; often instead of flowers roundish buds covered with small bracteoles; all flowers and buds together forming an oblong group not placed on any thickening of the stem. Flower-buds depressed in the beginning, soon becoming semiglobose, up to 0.75 mm in diameter, with 4—5 lobes, later opening into erect lobes and then up to 1 mm in diameter; the hermaphrodite and female flowers later obovate and 1.5—2 mm long through the development of the ovary, with 5 perigone lobes. Fruit unknown. All parts glabrous from the beginning.

Distribution: French Indo-China. Annam, Quang-tri prov., Col d'Ailao, alt. 500 m, 15 III 1936, POILANE 25403 (P, L), types, on *Scurrula parasitica*, this again parasitic on *Citrus nobilis*.

7. **Phacellaria compressa** BENTHAM, in BENTH. & HOOK. FIL., Gen. pl., II, 1 (1880) 229; HOOKER FIL., Fl. Br. Ind., V, 13 (1886) 235; COLLETT & HEMSLEY, in Journ. Linn. Soc. London, 28, no. 189—191 (1890) 122; HIERONYMUS, in ENGL. & PR., Nat. Pflanzenfam., III, 1 (1889) 216; BOERLAGE, Handl. Fl. Ned. Ind., III, 1 (1900) 181; BRANDIS, Ind. trees (1906) 554; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71; *Phacellaria Wattii* HOOKER FIL., Fl. Br. Ind., V, 13 (1886) 236; BRANDIS, Ind. trees (1906) 555; PILGER, in ENGL., Nat. Pflanzenfam., ed. 2, 16b (1935) 71; *Phacellaria ferruginea* W. W. SMITH, in Not. Bot. Gard. Edinburgh, X, 49—50 (1918) 188; non HANDEL-MAZZETTI, Symbol. sin., VII, 1 (1929) 157.

Stems usually up to 20 cm long, but coarser than in all other species and more strongly flattened, 1.2—2.5 mm in diameter above the base, often up to 4 mm broad towards the extremities, the young tips terete, 1 mm or more in diameter; bracts usually imbricate on the young tips, more rarely remote from the beginning, nearly 1 mm long, up to 0.75 mm broad, acuminate; prophylls none or indistinct, but each flower with a distinct involucre of numerous small bracteoles, the first flower of each group axillary, the next few flowers perhaps in the axils of the bracteoles, most of the many flowers around the first one but outside its involucre and especially developing between the bract and the first flower, the latter moving upwards, the bract gradually shrivelling, the whole flower-group at length up to 7 mm long, 2 mm broad, inserted on a slight thickening of the stem. Plants usually dioecious, or on the male plants a few female or hermaphrodite flowers. Indument on all young parts densely velvety, or even hirsute, ochraceous or ferrugineous, less dense on the older parts of the stems, but persistent in the flower groups. Flowers either papillose or glabrous in the very young state, always glabrous later. See fig. 2, on page 228, and plate V—VII & X.

Closely allied to *Ph. gracilis,* but this is more slender and has the bract-shape of *Ph. rigidula,* and is, moreover, glabrous. Likewise to *Ph. tonkinensis,* but this is nearly glabrous and more slender, and has no involucres at the base of the flowers, and much smaller bracts. Also to *Ph. malayana* through the coarse stems, the involucres around the flowers, and the velvety or hirsute, ferrugineous indument, but *Ph. malayana* has all flowers in the axils of the bracteoles and, consequently, roundish flower-groups.

Ph. compressa was based on young, badly preserved plants (plate V, 13). Comparison, however, with the plants listed below, and among which are the types of *Ph. Wattii* and *Ph. ferruginea,* showed that they all had to be included in one species. The types of *Ph. compressa* are female, or perhaps hermaphrodite, as appears from descriptions and drawings by L. Pierre preserved in the Paris Herbarium (see fig. 2). As is evident from a letter by Baillon, written to Pierre October 17, 1888, and accompanying Pierre's description, the latter was made from specimens which Baillon received from Kew. Of these materials, however, nearly nothing is left on the sheet or in the cover in the Paris Herbarium. The description is as follows.

"Phacellaria compressa Benth. ex specim. a Baillon recepto."

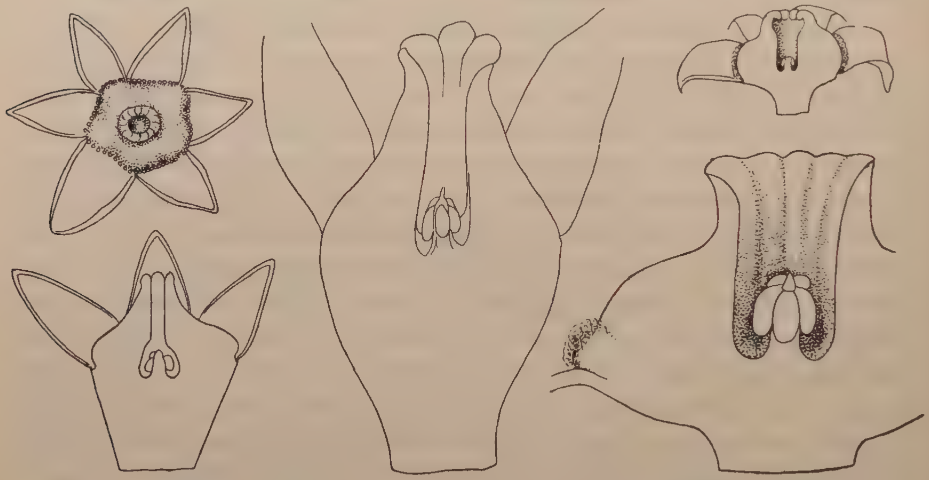

Fig. 2. Reproduction in ink of the most important leadpencil drawings by Pierre to his notes on the type specimens of *Phacellaria compressa,* preserved in the Herbarium of the Paris Museum of Natural History.

"Flores ♀ secus ramos valde compressos urnigeros immersi. Bracteae bracteolaeque 0. Perianthii folia 6 margine disci inserta, oblonga, acuminata, fulvo-pilosa, valvata. Discus superus cum stylo confluens, carnosus, ovarium vestiens vel basi ovarii et perianthii annularis. Ovarium fere superum vel basi leviter inferum 1-loculare vel ima basi incomplete 5-loculare. Stylus brevis crassus, usque placentam pervius, ore lobis 4—5 brevissimis. Columna axillaris leviter infera ad apicem libera supra ovula leviter producta, in cavitate erecta, ima basi inter ovula dissepimentis 5 divisa. Ovula 4—5, ab apice placentae descendentia."

"Fl. ♀? Stamina lobis perianthii alterna, filamentis complanatis brevibus, antherae apiculatae loculis valde divergentibus lateralibusque apertis."

"Nota. Je n'ai vu qu'une et deux étamines dans une fleur paraissant femelle. Ces étamines étaient alternes, non épipétales. De plus, l'ovaire n'est pas complètement infère. Il est même supère dans la fleur jeune et à peine semi-infère dans la fleur avancée. Le style est ouvert jusqu'au placenta qui se termine par une courte pointe, au dessus de laquelle pendent 5 ovules. Vers la base de ces ovules on distingue cinq rudiments de cloisons. Il n'est donc pas possible de placer cette plante parmi les Osyridae, où l'ovaire est complètement infère. Mais ce caractère de l'ovaire semble peu important. Cependant, s'il se vérifiait que les étamines fussent alternes, non épipétales, caractère dont je ne suis par sûr, rejetterait cette plant hors des Santalacées. On peut considérer le disque comme confluent avec le style, comme dans le genre Cathedra etc. Le disque a certainement 5 angles ou davantage alternes avec les lobes du périanthe."

Though Pierre examined too young flowers and consequently wrongly considered the ovary to be superior and (though not without doubt) the stamens to alternate with the perigone lobes, I take the liberty to publish his description, as it contains observations on the septa of the ovary and the number of ovules that have not yet been published elsewhere.

Of the types of *Ph. compressa* (Parish s.n.) in the Kew Herbarium I give the following description (plate V, 13):

Parasitic on a twig fragment in a fascicle of more than 11 stems, these all unbranched, 7.5—13 cm long, 1.25—1.5 mm in diameter above the slightly swollen base, terete or slightly angular, flattened upwards, up to 2.5 mm and here and there up to 3 mm broad, less than 0.5 mm thick, the young tips rounded or obtuse, 1.25—2 mm broad. Bracts ovate, acuminate, up to 1 mm long and 0.3—0.4 mm broad, convex, imbricate in the beginning, soon remote, later less distinct, somewhat spreading. Flowers soon developing in the axils, first single, surrounded by 2 or more bracteoles or not so, later moving upwards and giving place to rather many young flower buds, the whole group becoming oblong; flower buds strongly depressed, 5—7-merous, the oldest one of each group at length developing, female, including the inferior ovary obovate, 1 mm long and wide, the perigone depressed, the lobes triangular, the disc flat or slightly conical, the style short-cylindrical, truncate. Further stages of development unknown. All parts densely velvety, almost tomentose, ferrugineous, with exception of the flowerbuds, that are papillose in the very young state, glabrous later.

When Hooker described *Ph. Wattii* (see plate V, 14) as distinct from *Ph. compressa*, he was right in so far as his specimens were entirely different from the types of *Ph. compressa* in appearance and in a much more advanced stage of development. This also caused him to describe the flowers of *Ph. Wattii* as much larger than those of *Ph. compressa*. He was, however, wrong in describing *Ph. Wattii* as hoary. The type specimens look somewhat hoary through mould, but for the rest are rather ferrugineous, like those of *Ph. compressa* and *Ph. ferruginea*.

Of the type specimens of *Ph. Wattii* (WATT 6154) I give the following description:

Parasitic on a twig of *Macrosolen* (prob. *parasiticus*) of nearly 10 mm diameter, many stems over a distance of nearly 6 cm from the thickenings of the nodes, but not really fascicled. Stems up to 18 cm long, with several (up to 10) divaricate or ascending branches especially in the middle portion, terete and 1.25—2 mm in diameter above the slightly swollen base, towards the extremities sometimes thicker, sometimes thinner, here and there somewhat flattened, especially at the insertions of the branches, but not towards the extremities; the latter with obtuse ribs, that are decurrent from the axils. Bracts not imbricate, soon remote and convex through the developing flower-buds, triangular, acute, 0.75—1 mm long, 0.75 mm broad at the base, the depressedly globose axillary flower with 2 small prophylls and probably some small involucral bracteoles, perhaps with small flower-buds in their axils, and later with more small buds between the bract and the axillary flower moving upwards, the flower-group at length oblong or roundish-oblong, or even a few groups confluent, together up to 6 mm long, 3 mm broad, on slight thickenings of the stem, up to 2 mm high, the fallen-off flowers leaving shallow hollows in the stem. All stems apparently male. Male flowers depressed, up to 1 mm high, up to 1.25 or even 1.5 mm in diameter, usually 4—5-merous, the perigone lobes erect or somewhat spreading, short-triangular, thickish, 1 mm long and broad, the stamens as usual. Indument ochraceous to ferrugineous, or blackish at length, but not hoary, on all young parts shortly but very densely velvety, less dense later, the stems glabrescent in the lower portion, the flower-groups with bearded, somewhat tomentose bracteoles, the young flower-buds velvety, later papillose, but the adult flowers nearly glabrous.

Also W. W. SMITH was right in describing his *Ph. ferruginea* (see plate VI, 15) as a new species closely allied to *Ph. Wattii*, in so far as the type on which he based his species was rather different from the type of *Ph. Wattii* through the more robust stems, the larger bracts, that are more strongly imbricate on the young tips, and the more dark-ferrugineous indument; but among the materials listed below it seems impossible to distinguish more than one well-defined species. The types of *Ph. ferruginea* in the Edinburgh and Kew Herbaria are in a very advanced stage of development. The Edinburgh specimen is male, but in the accompanying cover there are detached fruits; the Kew specimen is female. Most of the flowers have fallen off the old stems, whereas the young stem tips do not yet bear flower-buds. The following description of the type specimens (FORREST 11585) must, therefore, remain incomplete.

Parasitic on twigs of 8—15 mm in diameter, probably of a *Loranthacea,* fascicled and scattered, on the nodes and the internodes, many together, up to 18 cm long, terete and 1.25—2.5 mm in diameter above the base, unbranched or with a small number of branches at different heights, sometimes entirely terete, often flattened at the insertions of the branches and towards the extremities, or even fasciate, the flower-groups on thickenings of the stems. Bracts imbricate, ovate-acuminate, up to 1 mm long, later more apart, spreading, and more triangular. Axillary flower-groups gradually more-flowered, finally oblong, up to 6 mm long, each flower with an involucre of small bracteoles. Flowers dioecious. Male flowers strongly depressed in the very young state, later more globose, with 4—5 erect perigone lobes when open, 1—1.5 mm in diameter, the oldest flowers nearly 2 mm high, with perigone lobes broadly triangular, thickish, up to 1 mm long, 0.8 mm broad. Detached fruits ovate or ovate-oblong, up to 5 mm long, 3—4 mm in diameter, crowned by the persistent perigone, glabrous.

As the type specimens of *Ph. ferruginea* are too incomplete to base a full description on them, I will give this from specimens that undoubtedly are identical with them, *viz.,* those collected by CHEVALIER, in Annam, under the numbers 30755 (♀, see plate VII, 17 and X, 26 and 27) and 30755-bis (♂, see plate X, 28).

Parasitic on *Loranthaceae,* female plants on *Taxillus chinensis,* male plants on *Macrosolen avenis,* fascicled and scattered on branches of 7—10 mm in diameter and single in the axils on twigs of 1—1.5 mm in diameter. Stems up to 15 cm long, irregularly branched especially in the lower and middle portion, the branches often branched again, the main stems 1.5—2.5 mm in diameter above the base, irregularly angular, here and there irregularly flattened, up to 3 or 4 mm broad or even fasciate, the young extremities terete. Bracts imbricate on the young tips, obovate from a broad base, short-acuminate, 0.75—1 mm long, 0.5—0.75 mm broad, soon convex through axillary buds, remote, gradually shrivelling, finally almost disappearing. Flowers in axillary groups, but also single on short axillary branches. First flower-bud of each group axillary, depressed, with an involucre of nearly 5 very small bracteoles; next flower-buds very near the first bud, perhaps developing from the axils of the bracteoles, soon more numerous buds outside the involucres of the preceding buds, especially between the bract and the first flowers, less on the adaxial side, very few laterally, all of them slightly immerged in hollows of the stem, that probably are formed by the indistinct fringed involucres, the whole group finally oblong, up to nearly 6 mm long 2 mm broad, the female groups on distinct thickenings of the stem, the male ones hardly so. Female flower-buds strongly depressed and not to be distinguished from the male flower-buds in youth, the perigone developing long before the ovary, depressed-pyramidal, at length the ovary developing, the whole bud becoming obovate, 2 mm long, 1.5 mm in diameter, the perigone lobes usually 5, more rarely 6, very rarely 4 in number, triangular, nearly 0.5 mm long; disc nearly flat; style very short, cylindrical, nearly 0.2 mm both in length and in diameter, truncate. Male flowers first strongly depressed, finally ovate, 1.5—1.75 mm high, 1.5 mm in diameter, the solid basal part obconical, the perigone lobes together semiglobose, usually 4, rarely 5 in number, triangular, thickish, valvate. Fruits not known in the adult stage, those available up to 6 mm long, with a fleshy outer and a hard inner layer, containing a 3 mm long seed with 6 longitudinal grooves and 6 lobes at the apex. Indument dense and velvety on all young parts, ferrugineous or more ochraceous, consisting of thickish papillose hairs, later gradually disappearing from the stems, persistent or partly persistent near the flower-groups and especially between the flowers and on the involucres. Flowers entirely glabrous from the beginning.

Of the further specimens listed below, Howell's from Yunnan (see plate VI, 16) are nearly identical with Forrest's, but they are female and abundantly fruit-bearing, with some of the fruits apparently ripe; they are parasitic on *Taxillus Delavayi.*

Collett's specimens from the Shan Hills Plateau are less robust than any of the further specimens and nearly all of the stems are simple, but for the rest they show no particularities. They are fascicled and scattered on twigs of a *Henslowia,* and all of them male. Also Robertson's specimens (plate X, 29—33) from the Taunggyi Crags are parasitic on *Henslowia,* but they are as robust as Chevalier's plants described above. They are partly male, partly female. The indument is rather more ochraceous than ferrugineous. One branch of the *Henslowia* shows many scars of stems already fallen off, whereas in the younger part new young stems are originating at several points. This suggests that *Phacellaria compressa* may creep under the bark of the host and may disappear at one point and reappear at another.

POILANE's no. 24714, from the Braïan, is female and parasitic on *Elytranthe albida*. The stems are abundantly flowering and already bear young fruits. They are very much like CHEVALIER's plants. POILANE's specimens from Blao, no. 22512 (see plate VII, 18), are parasitic on *Taxillus chinensis*, but for the rest cannot be distinguished from those of the former number. They are male, but one stem of the main bundle bears a few young fruits. POILANE's no. 22212 consists of broken young specimens on a fragment of a Loranthaceous branch; these specimens entirely agree in their characters with the other numbers of the same collector.

EVRARD's no. 1878 consists of non-flowering fragments, which cannot belong to another species and show no differences from *Ph. compressa.*

KLOSS's specimens consist of detached stems, most of them male, one female and with a beginning of fruiting. They are little hairy and the indument is rather light-coloured, but as for the rest they agree with other Annamese specimens I have no doubts as to their specific identity.

HAYATA's specimens collected under no. 576 are old and coarse branched male detached stems, which have lost most of their flowers and nearly all of their ferrugineous indument. The specimen collected by HAYATA under no. 905 together with *Taxillus chinensis,* is one branched female stem with many unripe fruits and only few open flowers.

KERR's specimens from Siam are very much like those collected by CHEVALIER and POILANE in Annam. They are parasitic on *Elytranthe albida* and bear numerous male flowers, less numerous hermaphrodite ones, and perhaps few female ones.

Distribution: Burma. "Mao" (*i. e.* Muang Mao, or Muang Maw), on the eastern frontier of India (not in Manipur, as is usually cited from the label), alt. 7500 ft, 22 II 1882, GEORGE WATT 6154 (K), type of *Phacellaria Wattii* HOOKER FIL., on *Macrosolen* prob. *parasitica.* — Shan Hills Plateau, alt. 5000 ft, II 1888, H. COLLETT 331 (K), on *Henslowia* ("a Viscum on another Viscum"). — Southern Shan States, Taunggyi Crags, alt. 5700 ft, 3 IV 1926, W. A. ROBERTSON 2110 (K), "flowers yellowish green, parasitic on no. 2109", which is a *Henslowia.* — Moulmein, C. PARISH s.n. (K), type of *Phacellaria compressa* BENTHAM.

China. Yunnan, Tali Range, Lat. 25°40′ N., 9—10,000 ft alt., IX 1913, GEORGE FORREST 11585 (E, K), "parasitic shrub of 6—12 inches, on ? in mixed forests", types of *Phacellaria ferruginea* W. W. Smith. — Yunnan, neighbourhood of Teng-yueh, 1911, E. B. Howell 325 (E), on *Taxillus Delavayi.*

French Indo-China. Annam, Lang Bian Mts., Dalat, 1400 m alt., 12—15 II 1914, Chevalier 30755 (P, L), female, on *Taxillus chinensis,* and 30755-bis (P), male, on *Macrosolen avenis.* — Upper Donnaï Prov., foot of the Braïan, near Djiring, 900 m alt., 4 III 1935, Poilane 24714 (P), female plants, on *Elytranthe albida,* this on *Quercus* no. 24711. — Dalat, 9 VI 1921, Hayata 576 (P), male; Dalat, arboretum, 24 XI 1924, Evrard 1878 (P), "Viscum, sur Loranthus 1877" = *Scurrula parasitica.* — Blao Agricultural Station, 800 m alt., 7 III 1933, Poilane 22212 (P), male. — *ibidem,* Poilane 22512 (P), on *Taxillus chinensis,* nearly male, but on one stem few female or hermaphrodite flowers. — Bellevue, Hayata 905 (P), on *Taxillus chinensis,* female. — Langbian Prov., Dran, 3—4,000 ft alt., III—V 1918, C. Boden Kloss s.n. (BM), "mistletoe, fruit green", male and female stems.

Siam. Kao Keo Kang, S. of Dan Sai, alt. 1300 m, 10 IV 1922, Kerr 5796 (Herb. Kerr), on *Elytranthe albida.*

To be excluded from the genus.

"*Phacellaria ferruginea* W. W. Sm.", Handel-Mazzetti, Symbol. sin., VII, 1 (1929) 157 = **Viscum Loranthi** Elmer, Leafl. Philipp. Bot., 8, art. 121 (1919) 3089; Danser, in Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 3—4 (1931) 464, ic. 27, b, c; in Philipp. Journ. Sc., 58, 1 (1935) 142.

This record was based on the number Handel-Mazzetti 4414 from China, Yunnan, in the Herbarium of the Vienna Natural History Museum, a fragment of which I could examine through the kind intermediary of Dr K. H. Rechinger.

Index of collectors' numbers.

Balansa 4108 = *Ph. tonkinensis,* type.
Chevalier 30755 & 30755-bis = *Ph. compressa.*
Collett 331 = *Ph. compressa*; 736 = *Ph. caulescens,* type.
Evrard 934 = *Ph. tonkinensis*; 1878 = *Ph. compressa.*
Farges 1511 = *Ph. Fargesii,* type.
Forrest 11585 = *Ph. compressa,* type of *Ph. ferruginea.*
Griffith 2745 = *Ph. rigidula,* type.
Handel-Mazzetti 4414 = *Viscum Loranthi.*
Hayàta 576 & 905 = *Ph. compressa.*
Henderson 23444 = *Ph. malayana.*
Henry 11085 = *Ph. rigidula.*
Howell 325 = *Ph. compressa.*
Kerr 5796 = *Ph. compressa.*
Kloss s.n. = *Ph. compressa.*

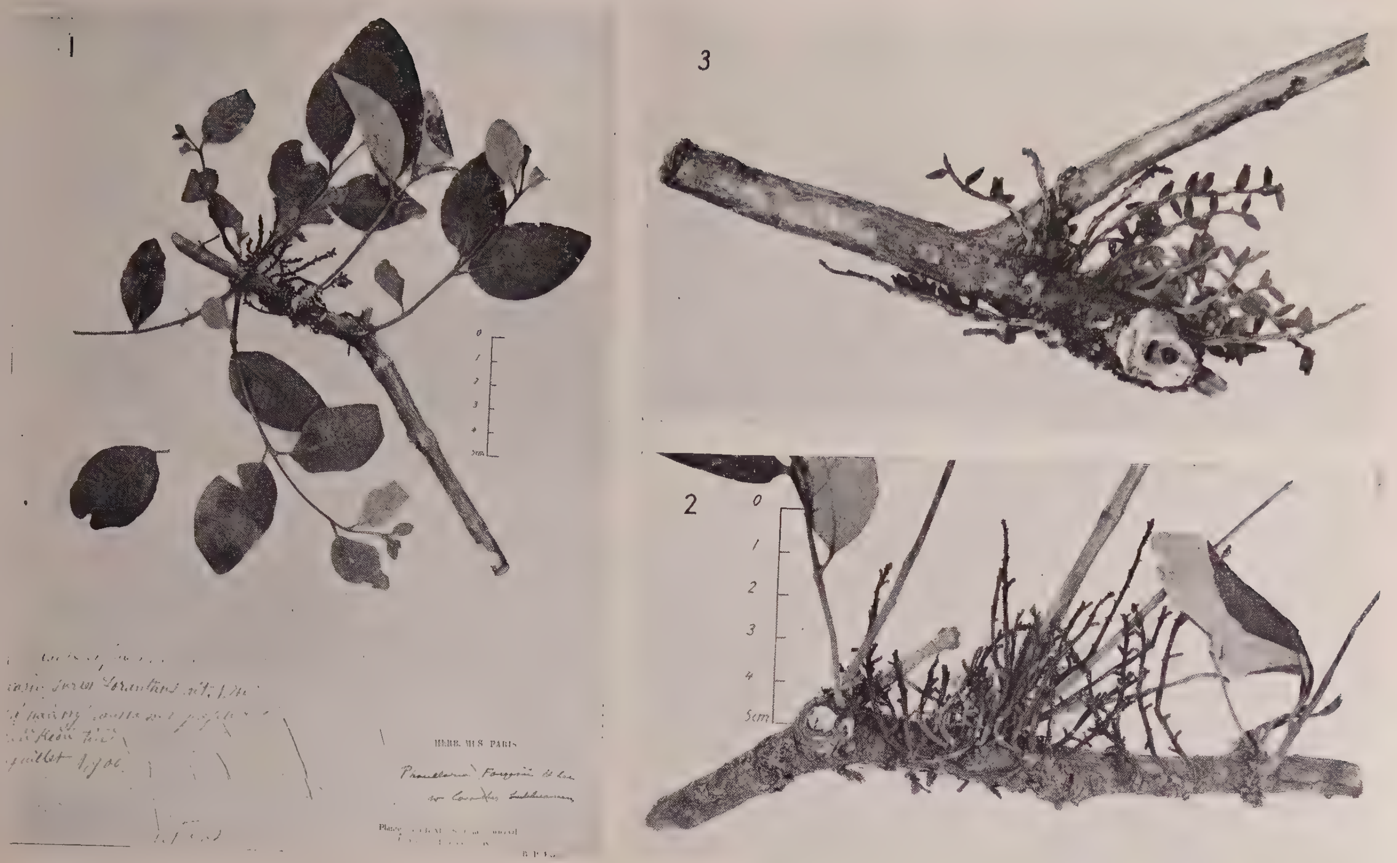

Plate I. *Phacellaria Fargesii*, some of the type specimens (Farges 1511) on *Taxillus sutchuenensis*; 1: young and flowering stems; 2: older stems; 3: fruiting stems (same enlargement as 2). — Photo L. Alkema.

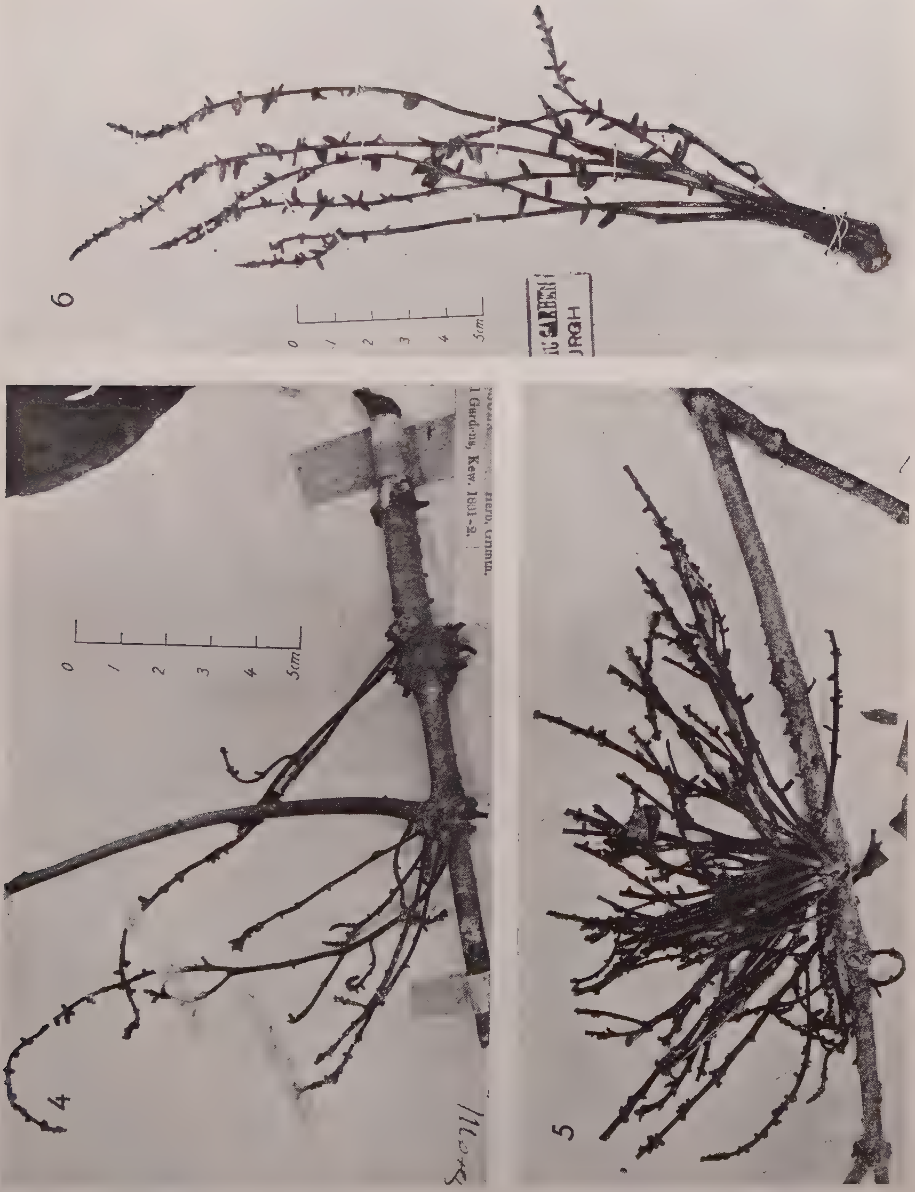

Plate II. *Phacellaria rigidula*; 4 and 5, type specimens (GRIFFITH 2745) on *Dendrophthoë*; 6: other specimen (MACGREGOR 1125). Photo L. ALKEMA.

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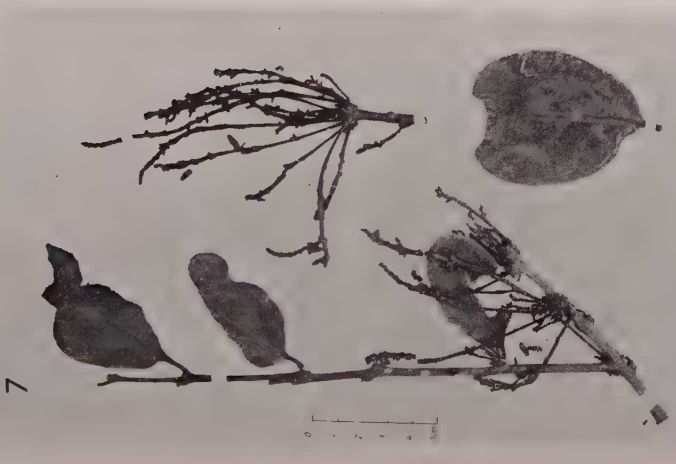

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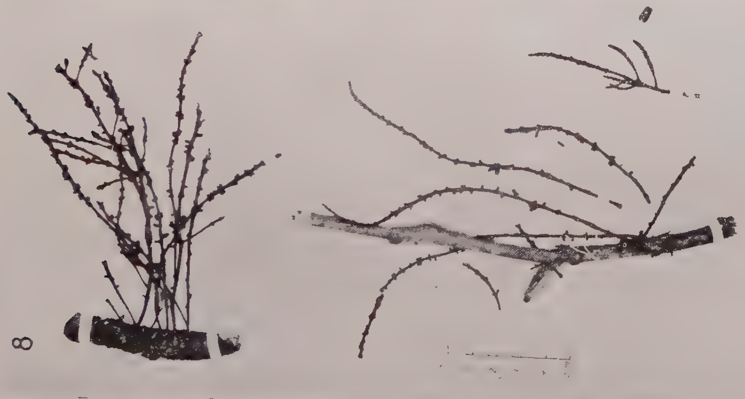

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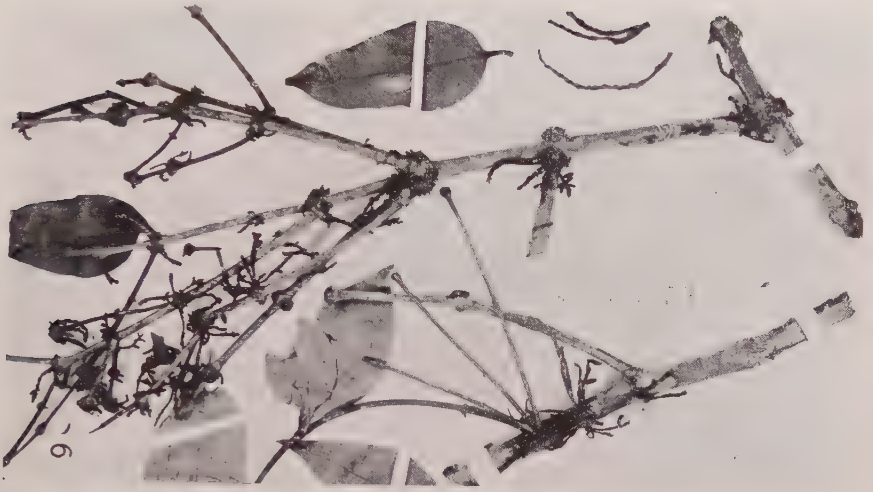


Plate III. *Phacellaria malayana*; 7: type specimens (H. C. ROBINSON s.n.) on *Dendrophthoë*; 8: young specimens (PARKER 2670) on unknown *Loranthacea*; 9: old specimens (SINGAPORE FIELD No. 23444) on *Macrosolen*. — Photo L. ALKEMA.

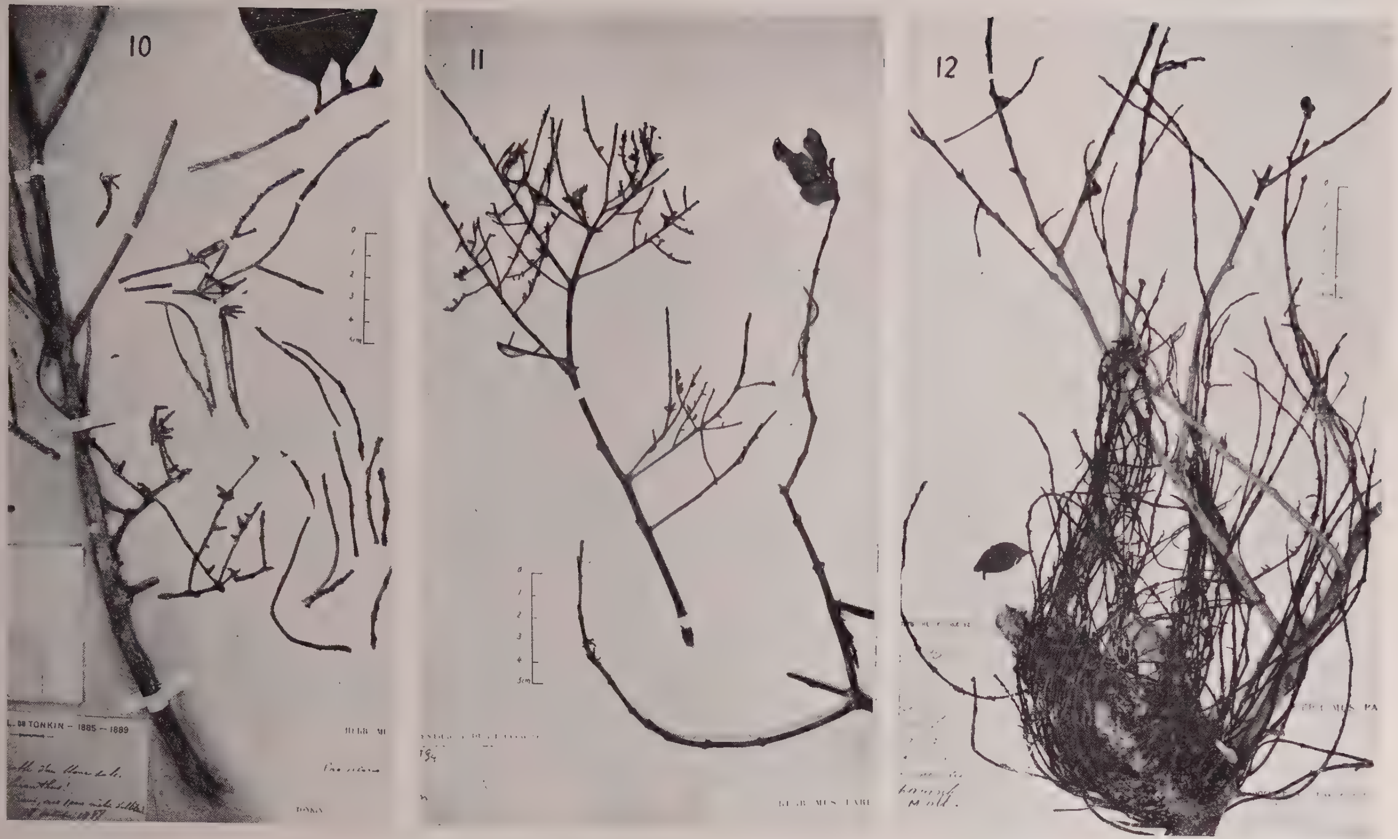
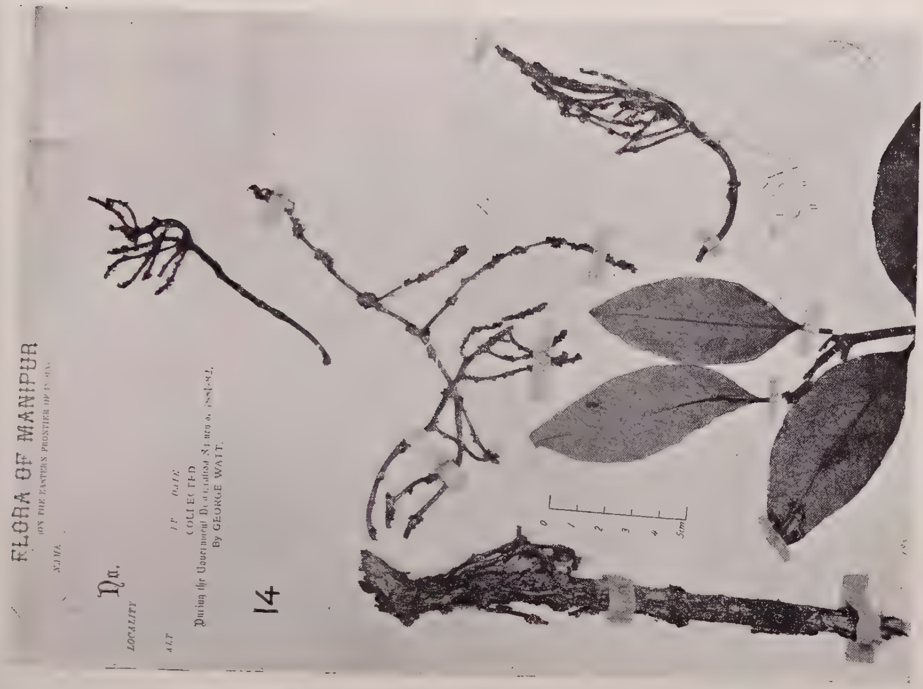


Plate IV. 10 and 11: *Phacellaria tonkinensis*; 10: part of the type specimens (BALANSA 4108) on *Taxillus*; 11: other specimen (EVRARD 934) on *Scurrula gracilifolia*; 12: *Ph. gracilis*, type specimen (POILANE 25403) on *Scurrula parasitica*. — Photo L. ALKEMA.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FLORA OF MANIPUR
ON THE EASTERN FRONTIER OF INDIA
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During the Government Demarcation Survey of 1881-82,
By GEORGE WATT.
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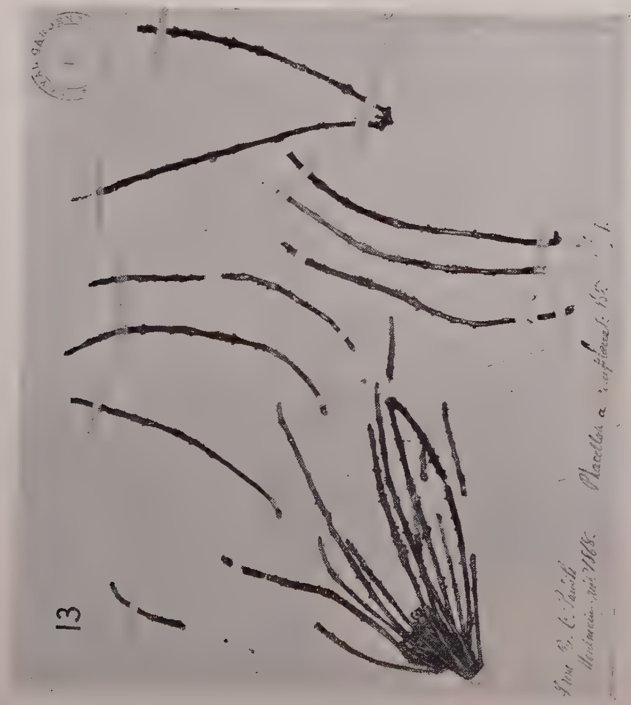

Plate V. *Phacellaria compressa*; 13: type specimens the species (PARISH s.n., same enlargement as the following; 14: type specimens of *Ph. Wattii* (WATT 6154) on *Elytranthe*. — Photo L. ALKEMA.

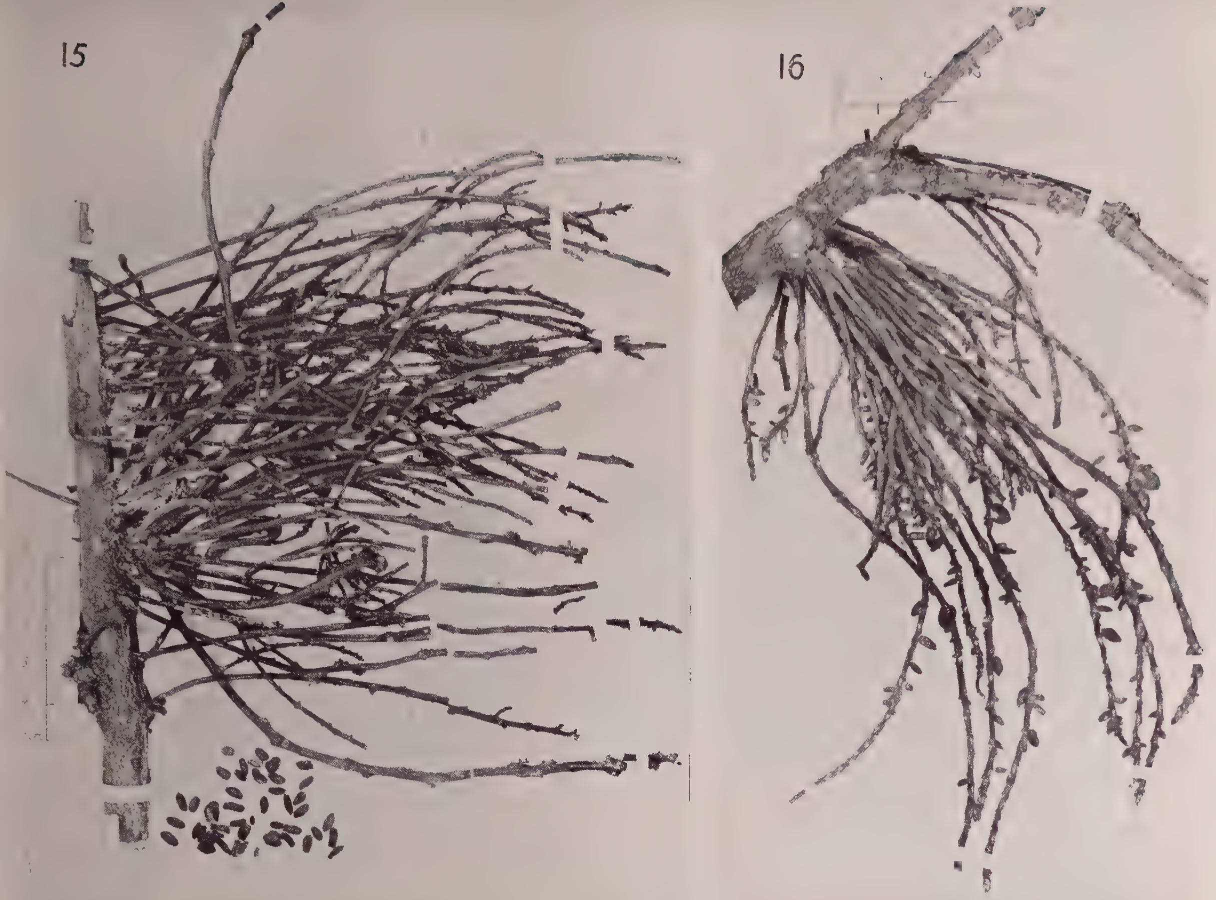

Plate VI. *Phacellaria compressa*; 15: type specimen of *Ph. ferruginea*, male plant and detached fruits (Forrest 11585) on unknown *Loranthacea*; 16: female plant (Howell 325) on *Taxillus Delavayi*. — Photo L. Alkema.

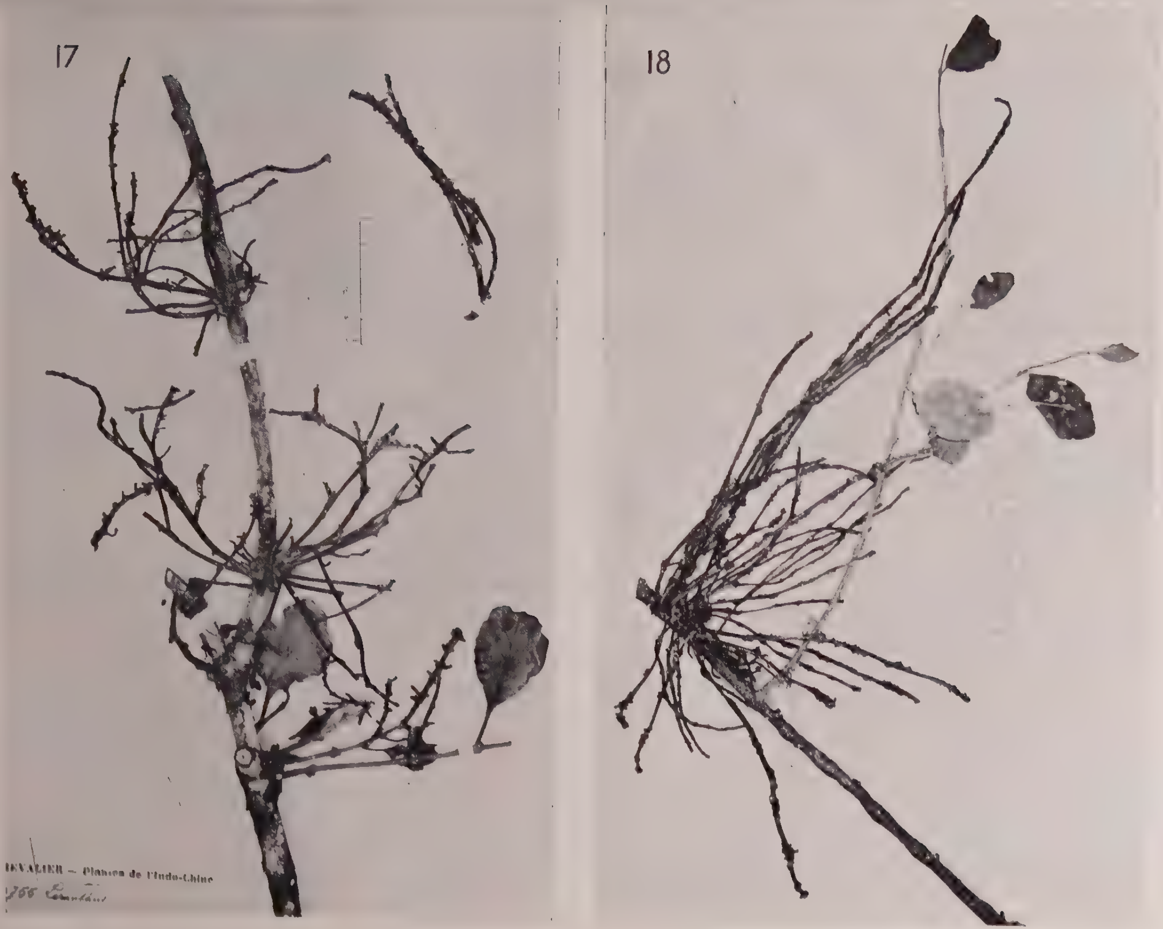

Plate VII. *Phacellaria compressa*; 17: female plants (CHEVALIER 30755) on *Taxillus chinensis*; 18: almost male plant (POILANE 22512) on *Taxillus chinensis*. — Photo L. ALKEMA.

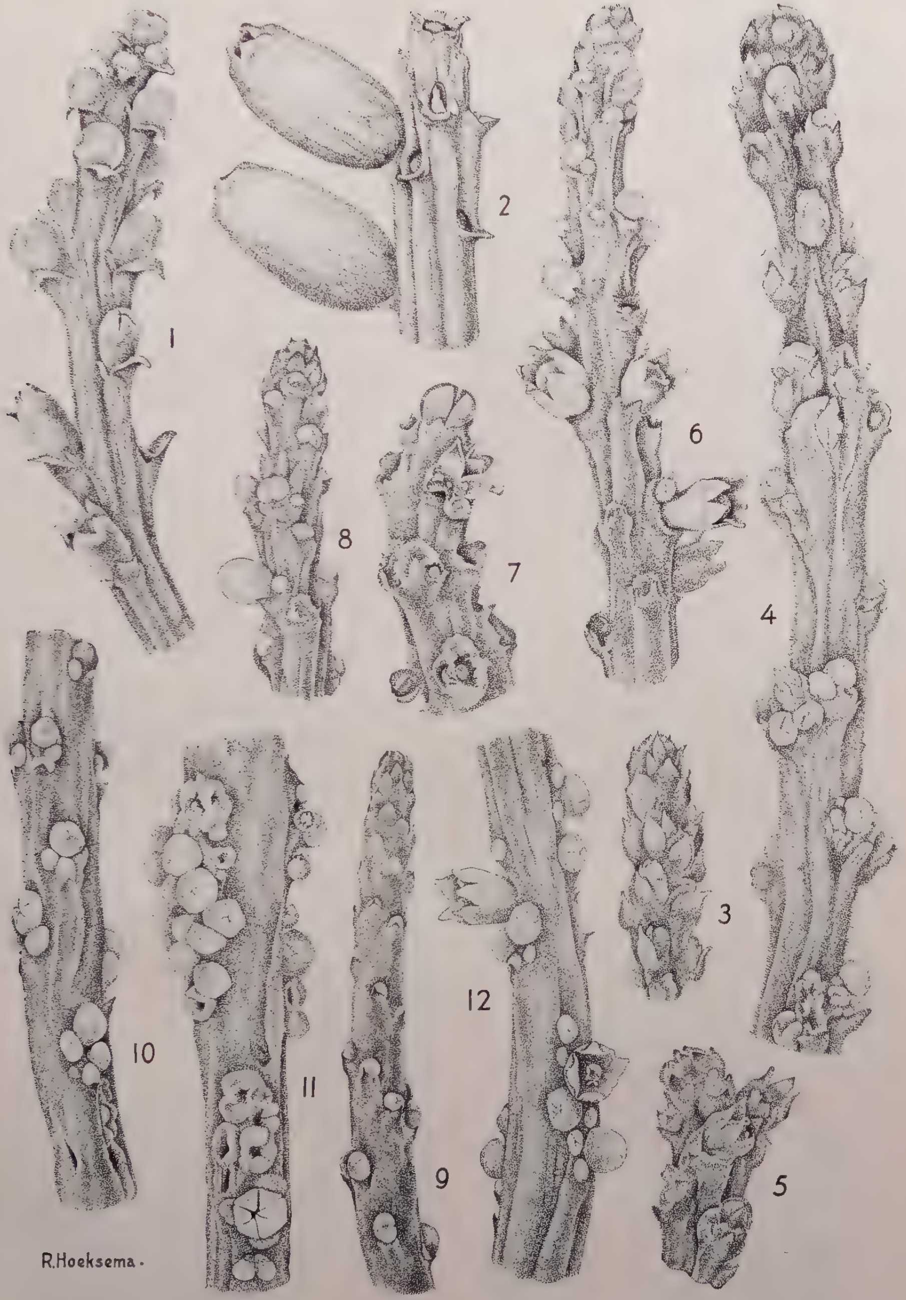

Plate VIII. 1 and 2: *Phacellaria Fargesii* (FARGES 1511); 1: flowering stem tip, 2: fruiting stem tip; 3—8: *Phacellaria malayana*; 3—4: stem tips in bud (ROBINSON s.n.), 5: stem tip with female flowers (*idem*); 6: stem tip with female flowers (SING. FIELD NO. 23444); 7: stem tip with male flowers (*idem*), 8: stem tip with buds (*idem*); 9—12: *Phacellaria tonkinensis* (BALANSA 4108), 9: young stem tip with flower buds; 10 and 11: stem fragments with male flowers in bud (11 upside down), 12: stem fragment with male flowers in bud and hermaphrodite flowers opened. All figures 5 × enlarged.

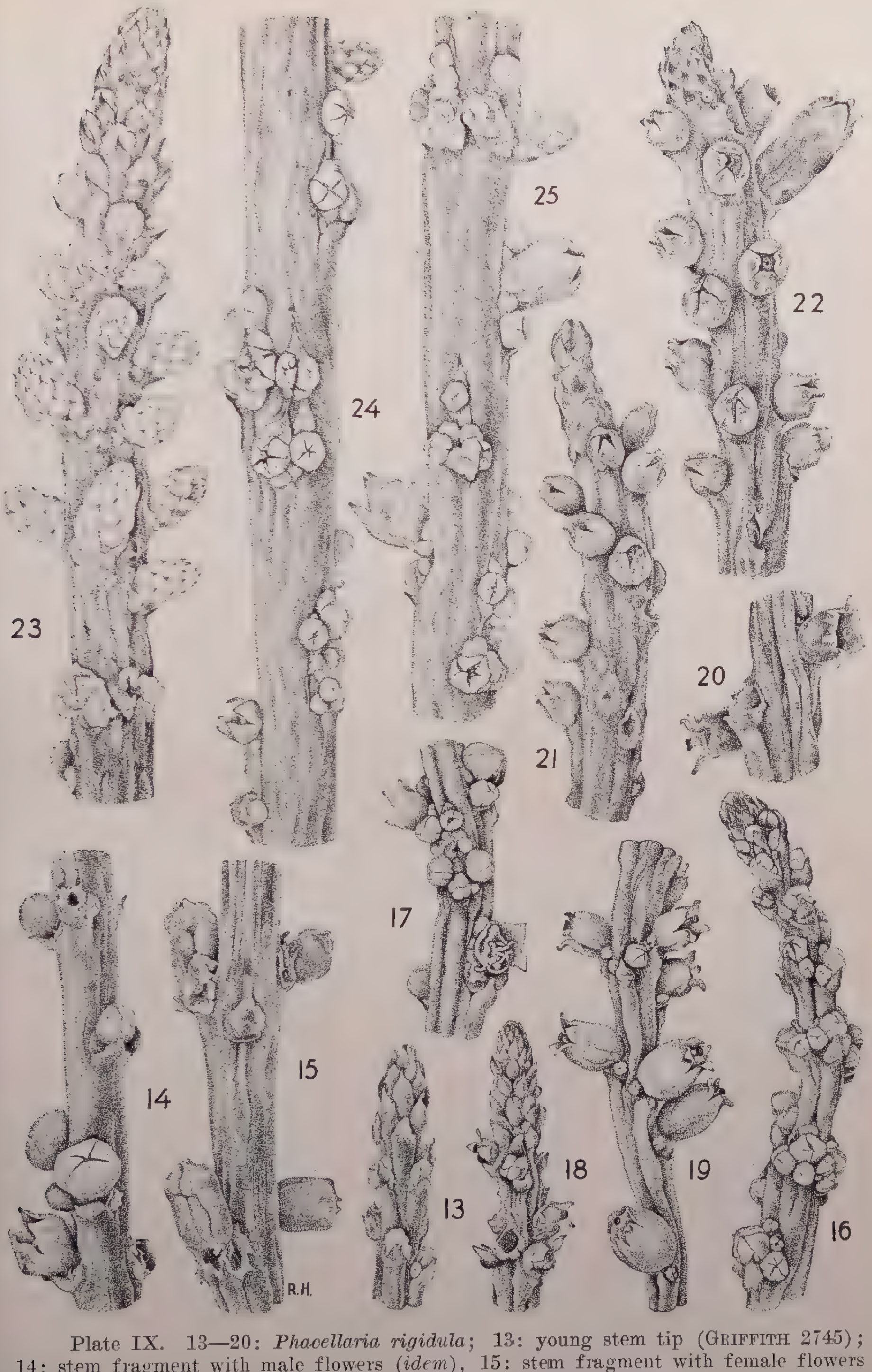

Plate IX. 13—20: *Phacellaria rigidula*; 13: young stem tip (GRIFFITH 2745); 14: stem fragment with male flowers (*idem*), 15: stem fragment with female flowers (*idem*), 16 and 17: stem fragments with male flowers (MACGREGOR 1125), 18 and 19: stem fragments with female flowers (*idem*), 20: stem fragment with female flowers (HENRY 11085; 21 and 22: *Phacellaria caulescens* (COLLETT 736), stem tips with female flowers; 23—25: *Phacellaria gracilis* (POILANE 25403), 23: stem tip with young branches and a few male flowers, 24: stem fragment with male flowers, 25: stem fragment with many male and two hermaphrodite flowers. All figures 5 ×

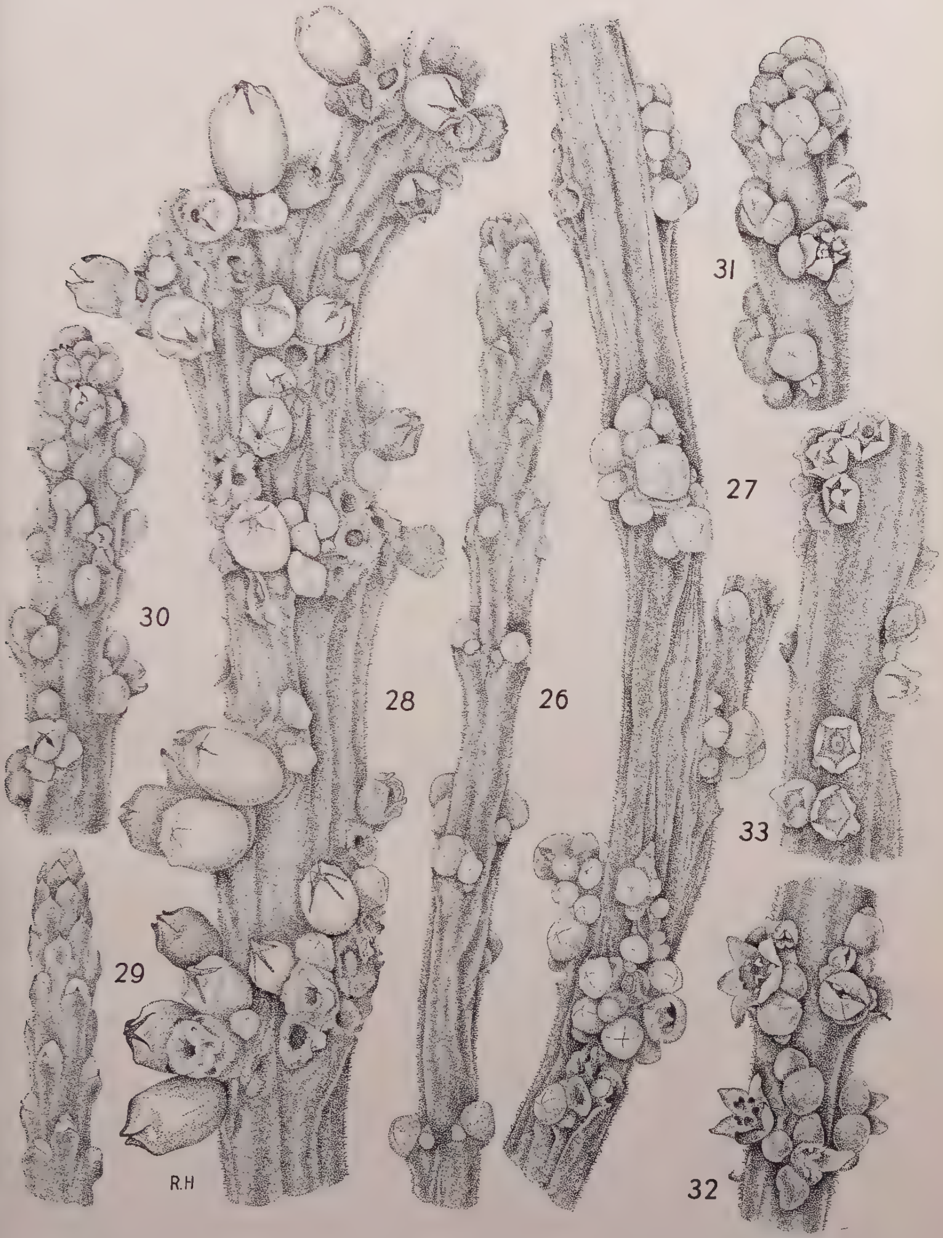

Plate X. 26—33: *Phacellaria compressa*; 26: young stem tip (Chevalier 30755-bis), 27: stem fragment of male plant (*idem*); 28: stem fragment of female plant (Chevalier 30755), 29: young stem tip (Robertson 2110), 30 and 31: stem tips of male plant (*idem*), 32: stem fragment of male plant (*idem*), 33: stem fragment of female plant (*idem*). All figures 5 × enlarged.

MacGregor 1125 = *Ph. rigidula.*
Parish s.n. = *Ph. compressa,* type.
Parker 2670 = *Ph. malayana.*
Poilane 22212, 22512, 24714 = *Ph. compressa*; 25403 = *Ph. gracilis,* type.
Robertson 2110 = *Ph. compressa.*
Robinson s.n. = *Ph. malayana,* type.
Singapore Field No. 23444 = *Ph. malayana.*
Watt 6154 = *Ph. compressa,* type of *Ph. Wattii.*

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BOTANICAL RESULTS OF A TRIP TO THE SALAJAR ISLANDS

by

W. M. DOCTERS VAN LEEUWEN

(Leersum).

Addenda et corrigenda.

In Blumea, Vol. II, 1937, pp. 239 to 277, appeared an article bearing the above title. It is a description of an excursion to the Salajar Islands, situated south of Celebes; lists of the plants found in the islands are appended. Prof. Dr C. E. B. Bremekamp wrote to me that in the Leiden Herbarium a small collection of plants, collected by me in the Salajar Islands, and long ago lent to the late Dr Th. Valeton, have been found. This collection contained, apart from the *Rubiaceae*, the special subject of Dr Valeton, some representatives of other plant families. Prof. Bremekamp sent me a list of names of these plants, for which I tender him my cordial thanks. Besides he communicated to me that a few plants are mentioned under wrong names in the original publication.

They are: nr. 86 of Djampea is not *Ophiorrhiza neglecta* Bl., but *O. parviflora* Reinw. Besides the number mentioned, 1573, two other specimens of this plant were collected in the same island, nr. 1618 and nr. 1633, both at an altitude of 200 m.

Nr. 302 of Salajar is not *Petunga longifolia* DC., but this plant is now called *P. microcarpa* (Bl.) DC. Two numbers not yet mentioned, 1729 and 1733, belong to this plant, and have been found at altitudes of 550 m and 500 m respectively.

Nr. 301 of Salajar is not *Pavetta indica* L., but *P. celebica* Brem.; to this species belongs also nr. 1735, which has been found at 500 m above sea-level.

Nr. 303 of Salajar, *Psychotria* spec. is *P. patentinervis* Miq.

The following plants have not yet been mentioned in former lists. The numbers follow on those of the publication in Blumea, Vol. II, 1937.

Salajar. Nr. 361. *Pouzolzia zeylanica* (L.) Benn. var. *alienata* Wedd., 200 m, D. 1833.

Nr. 362. *Jasminum carinatum* BL., 550 m, D. 1744.

Nr. 363. *Ophiorrhiza parviflora* REINW., 300 m, D. 1675.

Nr. 364. *Psychotria sarmentosa* BL., 400 m, D. 1791.

Nr. 365. *Borreria ocymoides* DC., 200 m, D. 1832.

Nr. 366. *Borreria hispida* (L.) K. SCH., D. 1857.

Nr. 367. *Desmodium triflorum* DC., 200 m, D. sin. num.

Kalaotoa. Nr. 60. *Borreria ocymoides* DC., D. 1353.

Bonerate. Nr. 53. *Jasminum* species, D. 1428.

Nr. 54. *Tarenna* species, D. 1442.

Nr. 55. *Ixora timorensis* DEC., D. 1415.

Nr. 56. *Paederia foetida* L., D. 1454.

Kalao. Nr. 59. *Pouzolzia zeylanica* (L.) BENN. var. *alienata* WEDD., 50 m, D. 1494.

Nr. 60. *Ixora timorensis* DEC., D. 1529.

Nr. 61. *Scyphiphora hydrophyllacea* GAERTN., D. 1518.

Djampea. Nr. 102. *Parsonsia Cumingiana* DC., 500 m, D. 1563.

Nr. 103. *Oldenlandia corymbosa* L., 20 m, D. 1555.

ON A NEW SPECIES OF POLYTOCA FROM JAVA

by

Dr J. TH. HENRARD
(Rijksherbarium, Leiden)

(Issued June 15, 1939).

The flora of the island of Java belongs, especially as to the family of the grasses, to the best explored ones. It was JUNGHUHN, who collected them extensively and his material was the basis of a fine enumeration by our countryman BUSE, in the year 1854. In modern times the grass flora of the island was thoroughly studied by Dr C. A. BACKER, who prepared not only very rich collections, but being familiar with the system of the Gramineae, gave in his "Flora van Java" a detailed study of this family with excellent descriptions and many very important data.

Unfortunately his species-concept and his nomenclature is not always up to date and it is to be hoped that a new modern Flora of Java can be prepared on the basis of the very important and rich material now at hand.

A region, explored so well, does not provide us with many new grasses, although in some less explored places new ones may be expected. It was therefore very interesting for me to learn from a letter from Dr BACKER that he had detected a new species of *Polytoca.* Having my publication on the Indian *Maydeae* at hand, Dr BACKER was convinced that the new grass was to be placed into the genus *Polytoca,* but at the same time represented a quite different and aberrant species. Dr BACKER was so kind as to communicate the whole material of this grass to me. Having studied it, I must admit that BACKER's grass is one of the most curious ones I ever saw. That this grass, which is rather plentiful at the locality, was overlooked by the various explorers of the region, finds its reasons in the fact that, when not in flower, it resembles a small sterile bamboo, agreeing not only as to its habit but also in many technical characters with many small members of the *Bambusaceae.* It is therefore not surprising that collectors who have seen the grass in the field, considered it a sterile or juvenile bamboo, and since such bamboos are hardly to identify correctly, collectors did not gather them. Fortunately, Dr BACKER visited the locality when the plants were in flower and he saw the inflorescences, which did not at all belong to one of the members of the *Bambusaceae*. He placed the grass therefore into the tribe of the *Maydeae*. After my inspection I must confess that I do not know another tribe which comes into consideration, although there are some characters agreeing with the *Andropogoneae*.

The new *Polytoca* is a very curious and outstanding species. To be quite sure that this grass is actually a species of *Polytoca*, we need the ripe caryopsis. As is wellknown, my system of the *Maydeae* is based upon the characters taken from the ripe or well-developed fruit in connection with the form of the "fuit-cases". Unfortunately, no ripe fruit nor nearly ripe ones could be detected among the material of Dr BACKER; the material has inflorescences with exserted peduncles but also many others which are for a great deal concealed by the uppermost sheaths. Since the inflorescences consist of a few female spikelets at the base of the spike and the upper part is entirely male, we are obliged to damage all the spikes in search for developed caryopses. Not willing to act in this way and convinced that in such immature spikes, ripe caryopses may hardly be expected, I prefer to wait till better and riper material is collected. It is therefore to be hoped that at the type locality, where this perennial grass is rather plentiful, explorers of the island of Java may be able to collect the quite mature inflorescences for a more close inspection of the grains. It may turn out that this curious grass belongs even to a new genus of the *Maydeae*. For the time being, I have accepted Dr BACKER's identification, chiefly because the inflorescence has some resemblance to

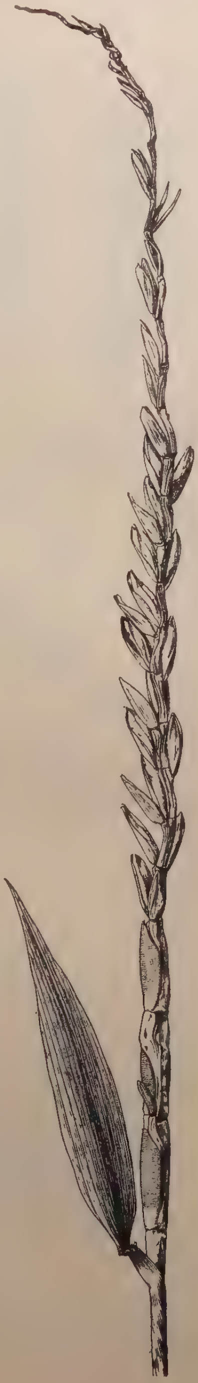


Fig. 1. — Panicle of Polytoca javanica. × 2.

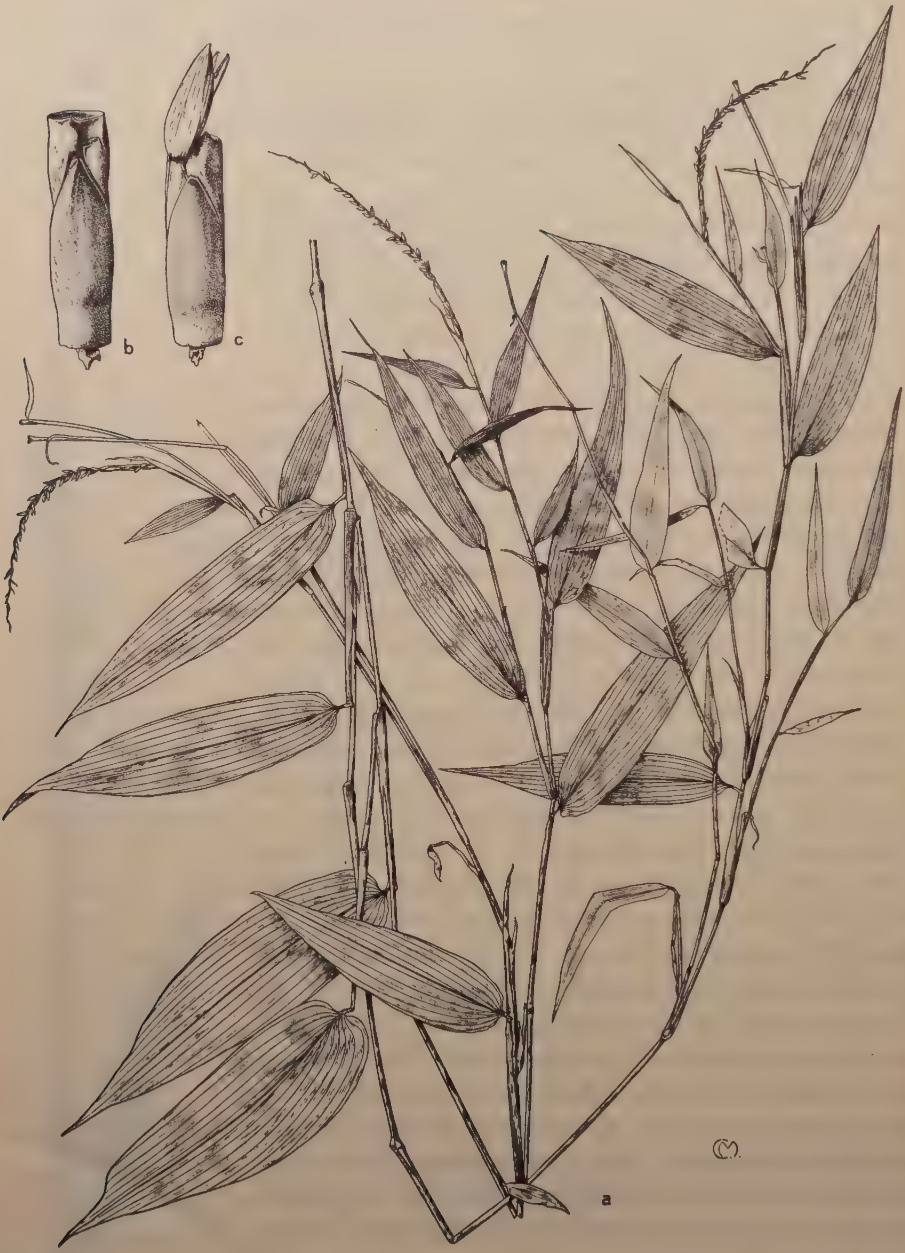


Fig. 2. — *Polytoca javanica* HENR. a. Habit, about $^2/_5$ ×. b. Rhachis with female spikelet, about $3^1/_2$ ×. c. id., with both spikelets, about $3^1/_2$ ×.

that of the *Polytoca macrophylla* BENTH., although many important differences are present. One of these differences I will discuss here more in particular.

Going over all the indian *Maydeae* hitherto known, e.g. if we look at the figures given in my paper, we see that, when the rhachis of the inflorescence breaks into pieces, each piece consists of a part of the rhachis with a female spikelet connected to it, moreover with a primary pedicel connected with the rhachis, bearing at its summit sometimes a male spikelet or a sterile one. Many of these characters remind us of those of the tribe of the *Andropogoneae.* The lower part of an inflorescence of *Polytoca* much agrees indeed with that of a *Rottboellia* in the *Andropogoneae,* but the upper part of the inflorescence in *Rottboellia* does not differ from the lower one. As has already been said, the upper part of the inflorescence of *Polytoca* is destitute of female spikelets. In the genus *Rottboellia,* the male spikelets are always attached to the primary pedicel.

At the same time it is very striking from the figures in my paper on the *Maydeae,* that the parts of the rhachis, when the spike is broken up, are always shorter or nearly as long as the spikelet itself. In *Polytoca* and in all other genera of indian *Maydeae* the so-called "fruit-case" is chiefly formed by the spikelet or by the lower glumes. In the new *Polytoca* we find the internodes of the rhachis much longer than the accompanying spikelet and the latter is partly imbedded in the hollow rhachis, a character well-known in *Rottboellia.*

In *Polytoca* there are generally two kinds of panicles, the ultimate ones exclusively male, the lateral ones mixed and consisting of female spikelets below and male ones upwards. All the spikes of the new *Polytoca* consist of mixed spikelets, purely male spikes are not present. From all these data taken here into consideration, we may conclude that our new species is a very aberrant member in the tribe of the *Maydeae,* being tentatively placed by me into the genus *Polytoca.* It may prove in the future to belong to a distinct genus and certainly represents in many characters a missing link between the two tribes *Maydeae* and *Andropogoneae.*

The new species is described here as **Polytoca javanica** HENR., nov. spec.

Perennis, suffruticosa, stricte erecta, valde repetiter ramosa. Culmi arundinacei, glaberrimi, duri, teretes, unilateraliter applanati, internodiis copiosissimis, vulgo ad 10 cm longis; nodi glabri, tumidi, unilateraliter incrassati; vaginae hiantes, vulgo internodiis breviores, inferne latae,

canaliculato-carinatae, valde striatae, superne angustatae, glabrae vel superne inter nervos punctulato-scabrae, marginibus interdum subpuberulis, superiores internodiis longiores. Prophyllum valde evolutum. Laminae breve petiolatae, pedicello 2 mm longo, inferiores basi subrotundatae vel in petiolum contractae, superiores brevissime petiolatae vel sessiles, basi angustatae, auriculae pilis albis ciliatae, pilis caducis; ligula brunnea, truncata, subscariosa, brevis, vix 1 mm longa; laminae virides, inaequilaterales, nervo medio crasso, nervis lateralibus 12—14 praeditae, marginibus inferne subundulatis, haud cartilagineis, oblongo-lanceolatae, sensim acuminatae, bene evolutae circa 10 cm longae ad 3 cm latae, laminae superiores vel praesertim eae ramulorum multo minores et angustiores. Inflorescentiae terminales vel laterales, isomorphae, pedunculus si bene evolutus exsertus, superne dilatatus et subcupulatis. Paniculae spiciformes, angustae, circa 8 cm longae, inferne foemineae, cylindraceae, vix 2 mm latae, superne masculae vel neutrae, laxae, ad 5 mm latae. Pseudospica inferne e spiculis foemineis paucis (haud raro 3) et spiculis masculis multis formata, rhachis fragilis, multiarticulatus, articulis inferioribus facie interiori distincte excavatis cum pedicellis liberis cavum pro recipienda spicula formantibus in quo gluma secunda omnino immersa est, recte disjungentibus, disjunctis, apice foramine profunde excavatis praeditis. Spiculae sessiles biflorae cum pseudocallo circa 1 mm longo glaberrimo a reliqua gluma depressione laevissimi separato, circa 7 mm longae, cavum exacte, praeter apicem, occludentes; gluma prima lanceolata, subacuminato-obtusa, superne leviter bicarinato-alata, dorso convexa, minute punctulato-scabra, intus plurinervosa, extus nervis haud visibilis, gluma secunda lanceolata, subacuta, chartaceo-membranacea, haud alata, leviter sulcata, primam subaequans, indistincte 3—5-nervosa, glumae fertiles hyalinae circa 3-nervosae, leviter acuminatae, paleae triangulari-lanceolatae, angustiores, caryopsis non vidi.

Java: Resid. Besoeki, southcoast near Poeger, base of the Goenoeng Watangan, limestone hill, 25 m above sealevel, locally common along somewhat shadowed paths, 1 April 1929, leg. C. A. Backer no. 36799.

Typus speciei in Herb. Lugd. Bat. sub no. 938.297 — 134.

NOTES ON JAVANESE CALCICOLE CYANOPHYCEAE

by

JOSÉPHINE TH. KOSTER
(Rijksherbarium, Leiden)

(Issued June 15, 1939).

In West as well as in East Java a *Cyanophyceae* association has been found, that from both localities shows a remarkable similarity in composition. Both were growing on limestone rocks and had the same greyish velvety appearance. The localities are:

West Java, Koeripan near Buitenzorg, alt. ± 200 m (Lütjeharms n. 5461, 4 VII 1936) and

East Java, Malang, South coast, South of Wlingi near kampong Nglijep, alt. 0—500 m (Groenhart s.n., 4 X 1936).

The principal components are: *Scytonema Hofmanni* Ag., *Schizothrix chalybea* (Kütz.) Gom. and less frequent *Scytonema (Petalonema) crassum* Naeg.

In the association from West Java are mixed: *Schizothrix violacea* Gardn. and in one place *Nostoc commune* Vauch.

In the association from East Java in one place is found *Gloeocapsa gigas* W. et W. S. West and separate from the other species *Gloeocapsa Sibogae* Web. v. B.

Scytonema Hofmanni Ag. is most abundant in the association. The filaments are hardly falsely branched here. The sheath is yellowish brown (sometimes uncoloured) and covered with lime.

The *Scytonema* concerned should be brought to *Scytonema julianum* Menegh., which, however, is put to the synonyms of *Sc. Hofmanni* Ag. by Bornet and Flahault (lit. 1) V, p. 98. According to these authors the lime-covered sheath of *Sc. julianum* Menegh. cannot be a valuable characteristic, since in the same colony sheaths with and without lime are to be found.

Scytonema Hofmanni Ag. has been collected in East Java before (Geitler und Ruttner, lit. 7, pp. 317, 448). It seems to be cosmopolitan. It is often found growing on limestone and the lime-covered sheaths may be due to this habitat.

Schizothrix chalybea (Kütz.) Gom. Monogr. Oscill., 1892, p. 319 t. IX, f. 3—5, is based on *Symphiosiphon chalybeus* Kütz. The type is preserved in the Rijksherbarium, Leiden. It is collected in Orizaba "inter muscos" and was appearingly growing on calcareous soil. Mixed in the type collection is *Petalonema alatum* Borzi. Gomont's figure (lit. 8) Pl. 9, fig. 3 gives a good impression of the dichotomous branching of the tips of the sheaths. These tips are long and pointed, often empty, which is the cause of the silvery greyish colour of the superior part of the thallus. In the type the bluegreen trichomes mostly occur single, or with two in a sheath. In the Javanese specimens usually one, but sometimes five trichomes are found in a sheath.

The distribution of this species was restricted to Bahamas, Mexico and Panama (together with *Schizothrix violacea* Gardn., acc. to Drouet lit. 2, p. 603). Now that it has been found growing in Java its area is considerably enlarged. All habitats known are on limestone.

Scytonema crassum Naeg. in Kütz. Spec. Alg., 1849, p. 894, Tab. Phyc. II, 1850—1852, T. 26, IV. The type of this species is preserved in the Rijksherbarium, Leiden. It has been collected on a moist rock near Zürich, which proves to be a calcareous substratum. In the original diagnosis Kützing mentions a colourless sheath. Frémy (lit. 4) p. 43 indicates this exterior sheath also. In the type as well as in the Javanese specimens sometimes a more or less alate exterior sheath is seen at the terminal (younger) part of the filamentum, which exterior sheath is hyaline. It is continued along the filamentum, but grows thinner to the lower part of the filamentum. On account of this alate sheath *Scytonema crassum* can be placed in the genus *Petalonema* as well. This has been done by Frémy, who considers *Petalonema* as a section of *Scytonema* moreover.

Upper part of the filamentum of the Javanese specimens to 80 μ broad (as in the type). Trichomes 12—25 (in the type 16—20) μ broad. Cells in the upper part of the filamentum 4—7 (in the type 6—7) μ long.

Scytonema crassum resembles *Scytonema myochrous* (Dillw.) Ag. and is to be distinguished by the broader trichomes and filaments and the shorter cells.

Distribution: Europe (France, Switzerland, Italy), Ceylon, Java, Bahamas.

On the label of the type is written "Scytonema crassum und Scytonema tenuissimum-Zürich". *Scytonema tenuissimum* NAEG. is described in KÜTZ. Spec. Alg., 1849, p. 893. Next to *Scytonema crassum* the type collection contains filaments of a *Scytonema* with trichomes, which are shriveled up to 2—3 μ narrow canals, without a clear cell structure and normal trichomes, which appear to belong to *Scytonema mirabile* (DILLW.) BORN. If the filaments with shriveled trichomes have been described as *Scytonema tenuissimum* KÜTZ., which seems to be the case, this species ought to be put to the synonyms of *Scytonema mirabile* (DILLW.) BORN. Some filaments belonging to *Petalonema alatum* (BORZI) BERK. excepted, no other *Scytonema* has been observed in the type collection of *Scytonema crassum.*

Schizothrix violacea GARDN. emend. DROUET (lit. 2) p. 603. Filaments much twisted, sometimes surrounding filaments of *Schizothrix chalybea.*

This species seems to be a special calcicole plant. DROUET records from both habitats known up to this time its growing on limestone.

Distribution: Panama, Porto Rico, Java.

Nostoc commune VAUCH. Only in one place in the association this species was found. It seems to be an occasional appearance there. Trichomes with large cells, 4½—7 μ in diam.; heterocysts 7—8 μ in diam.

This cosmopolitan alga had been collected in Java before.

Gloeocapsa gigas W. et G. S. WEST in Journ. Linn. Soc. Bot. 30, 1895, p. 276, Pl. XVI, fig. 11—13 — *Anacystis gigas* GARDN. in Mem. N. Y. Bot. Gard. VII, 1927, p. 15.

According to the diagnosis the Javanese *Gloeocapsa* belongs to this species.

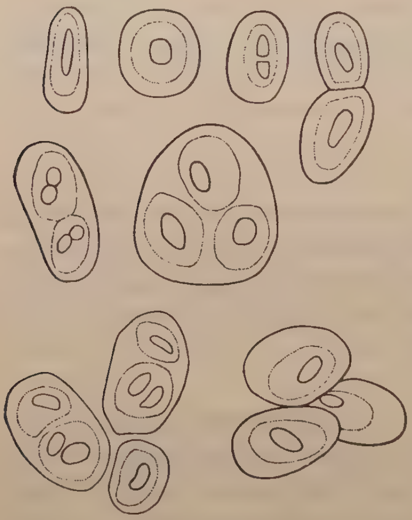
Colonies consisting of 1—50 cells, 14—200 μ in diam. General sheath brownish yellow. Individual sheaths numerous, often very distinct. Cells about 14 μ in diam., cell walls more or less warty, scabrous, cell contents dark bluegreen.

Distribution: Samoa Islands, Panama, Antilles, Java. The habitats known are walls, limestone, a damp rock, an old wood.

Cyanophyceae collections from the travertine hills of Koeripan have been made before by RUTTNER (lit. 7) p. 335, but the association described above was not found.

Gloeocapsa Sibogae Web. v. B. Liste Alg. Siboga I, 1913, p. 6; Geitler (lit. 6) p. 189; J. de Toni, Diagn. Alg. Nov. III, 1938, p. 260. In the association here described the *Gloeocapsa* was growing separately from the rest and purely, without any species mixed. The type of this species, collected on the Siboga expedition, is preserved in the Rijksherbarium, Leiden.

The Javanese specimens are growing in the limestone, below the surface and on it. The bluegreen inside layer of the general colony contains *Gloeocapsa* cells, single or in colonies; colonies 3—25 μ in diam. consisting of 2, 4 or many individuals, more or less globose or ellipsoid. Cells together with the hyaline sheath 4—6 μ in diam., without sheath minute, 1—2 μ in diam. Sheath outside distinctly, inside indistinctly lamellose. Cell contents bluegreen, strongly reflecting the light. The outer layer of the general colony is a vast more or less gelatinose (in dry state cartilagineous) brownish crusty substance. The sheath of the cells are thicker and more turbid here. Cells without the sheath still smaller than those of the inner layer: 1 μ or less in diam. here, sometimes nearly bar-shaped, irregular.



Type of Gloeocapsa Sibogae Web. v. B. × 2500.

Most probably this *Gloeocapsa* penetrates below the surface of the limestone and dissolves lime accumulating it in its sheaths.

Distribution: West New Guinea (Isle of Saboeda, Siboga exp.); East Java, Malang, South Coast, bay of Serang, South of Kesamben, alt. ± 1 m — leg. Groenhart s.n., 24 X 1937; Malang, South Coast, South of Wlingi, near Kampong Nglijep — leg. Groenhart s.n., 4 X 1936. All three habitats are on limestone adjoining the sea.

Geitler (lit. 6) p. 189 suggests, that *Gloeocapsa Sibogae* belongs to the same species as *Gloeocapsa punctata* Naeg. However, the last species has been found growing on moist inland rocks, whereas *Gloeocapsa Sibogae* has a habitat unusual for a *Gloeocapsa* (adjoining the sea), moreover penetrating the limestone. A sample in the herbarium Kützing, collected by Nägeli near Zürich on wet rocks (proving to be calcareous) contains *Gloeocapsa punctata* NAEG. mixed with two other species. The label is written by NÄGELI himself and this specimen seems to be the type or from the same collection as the type. *Gloeocapsa punctata* does not show the remarkable and vast gelatinous crust of *Gloeocapsa Sibogae*, purely consisting of the one species only. The cells are globose 1—2.5 μ in diam. without, 2—4 μ with sheath. The cells of *Gloeocapsa Sibogae* are globose to nearly bar-shaped.

PIA (lit. 11) p. 14 enumerates *Gloeocapsa punctata* among the *Cyanophyceae*, which precipitate lime. *Gloeocapsa Sibogae* in the contrary has to be added to the *Cyanophyceae*, which destruct limestone rocks.

New for Java are the following species: *Scytonema crassum* NAEG., *Schizothrix chalybea* (KÜTZ.) GOM., *Schizothrix violacea* GARDN., *Gloeocapsa gigas* W. et W. S. WEST, *Gloeocapsa Sibogae* WEB. v. B.

Probably strictly calcicole are: *Scytonema crassum* NAEG., *Schizothrix chalybea* (KÜTZ.) GOM., *Schizothrix violacea* GARDN., *Gloeocapsa Sibogae* WEB. v. B.

Prefer growing on limestone: *Gloeocapsa gigas* W. et W. S. WEST, *Scytonema Hofmanni* AG.

Literature.

1. BORNET, E. et CH. FLAHAULT, Révision des Nostocacées hétérocystées I—IV. Ann. Sci. Nat. Sér. 7 Bot. 3, 4, 5, 7, 1886—1888.
2. DROUET, FR., Some Myxophyceae from the Canal Zone. Bull. Torrey Bot. Club 64, 1937, p. 599—604.
3. FORTI, A., J. B. DE TONI, Sylloge Algarum V, 1907.
4. FRÉMY, P., Les Scytonémacées de la France. Fl. Algol. de France, 1927.
5. GARDNER, N. L., New Myxophyceae. Mem. N. Y. Bot. Gard. VII, 1927, p. 1—145.
6. GEITLER, L., Cyanophyceae. RABENH. Krypt. Fl. von D., Oe. und der Schw. XIV, 1930—1932.
7. —— und F. RUTTNER, Die Cyanophyceen der Deutschen Limnol. Sunda-Exped. Archiv f. Hydrobiol., 1935, Suppl. Bd. XIV, Trop. Binnengew. VI, p. 308—483.
8. GOMONT, M., Monographie des Oscillariées. Ann. Sci. Nat. Sér. 7 Bot. XV, 1892, p. 263—369.
9. OYE, P. VAN, Beitrag zur Myxophyceen-Flora von Java. Hedwigia 63, 1922, p. 174—197.
10. ——, Zweiter Beitrag zur Myxophyceen-Flora von Java. Hedwigia 64, 1923, p. 268—285.
11. PIA, J., Die Kalkbildung durch Pflanzen. Beih. Bot. Centralbl. LII, 1934, p. 1—72.
12. WILDEMAN, E. DE, Les Algues de la flore de Buitenzorg, 1900.

A NEW VITEX FROM MALAYSIA

by

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(Rijksherbarium, Leiden)

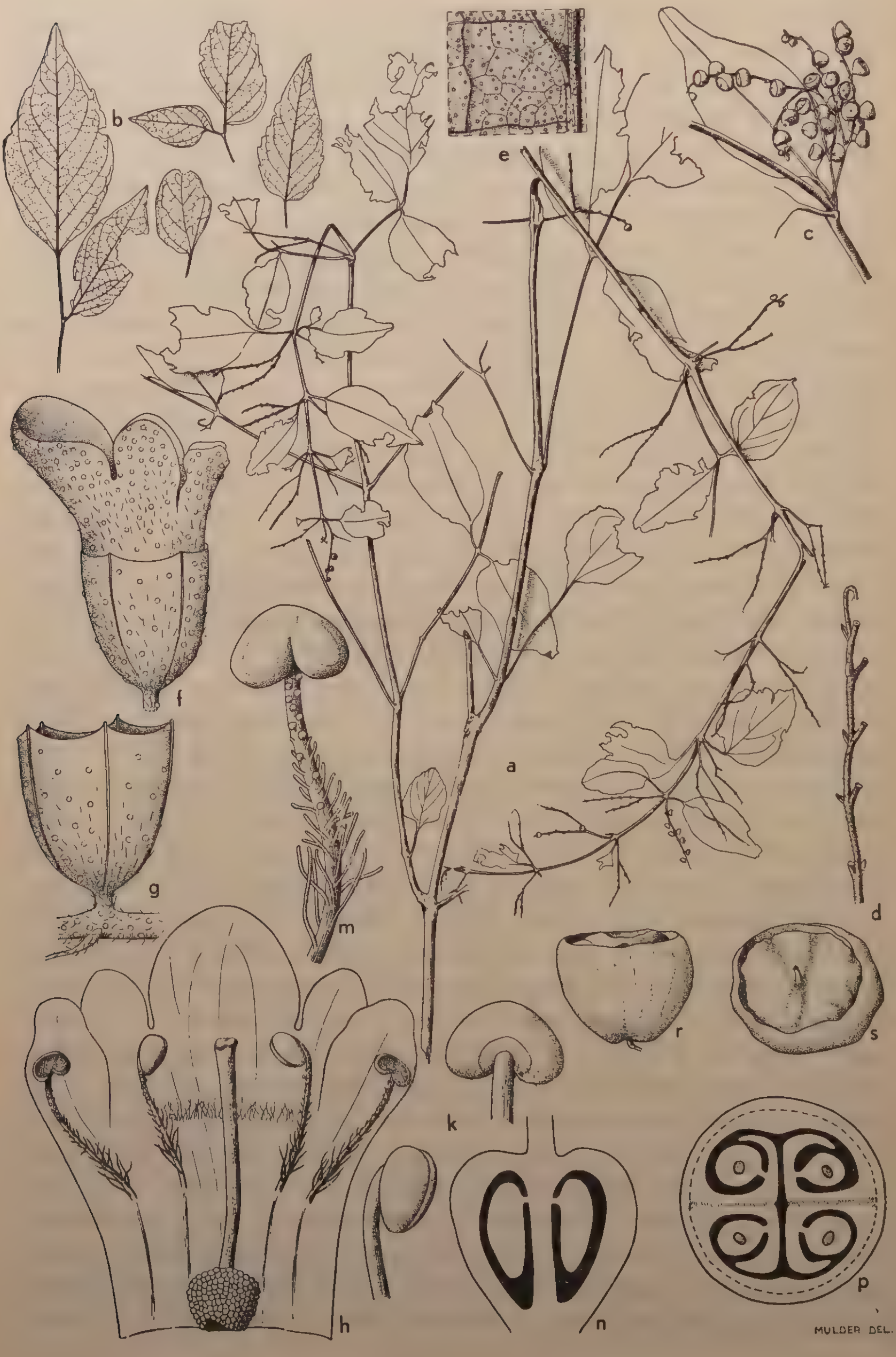
(Issued June 15, 1939).

In 1919 Dr C. A. BACKER collected a plant in the Kangean Archipelago which had the appearance of a *Cymaria* so that the collector provisionally called it "*Cymaria triphylla* BACKER" (MS.). The same species was also collected by KARTA on the Island of Bawean in 1928. Some other sheets already extant in the Herbarium at Buitenzorg for a long time among the indeterminate specimens were recognized as identical with this "*Cymaria*" (TEYSMANN nr. 1750, Madoera and nr. 1768, Bawean). In 1937 Dr BACKER, when working up Javanese plants, had a closer examination of this plant and concluded that it could not be inserted in *Cymaria,* and even not in the Labiatae, but that it had rather to be put into the Verbenaceae. However, he found himself unable to identify the species with the monograph of the Malaysian Verbenaceae (H. J. LAM, The Verbenaceae of the Malayan Archipelago, etc., Groningen 1919), nor in the revision of that family (H. J. LAM & R. C. BAKHUIZEN VAN DEN BRINK, Bull. du Jard. bot. de Buitenz., III, 3, 1921). He therefore kindly put the specimens into our hands for closer examination. Moreover, a part of the alcohol material preserved at Buitenzorg was kindly put at our disposal. The material appeared to represent a hitherto undescribed species of *Vitex.* We are indebted to Dr BACKER and to Dr D. F. VAN SLOOTEN, Keeper of the Buitenzorg Herbarium, for their kind assistance and their allowance to publish our results in this Journal.

Vitex cymarioides H. J. LAM et A. D. J. MEEUSE, nov. spec., *Fig. 1* — *Cymaria triphylla* BACKER. MS. — Frutex vel suffrutex; rami subtus lignosi, subteretes, adscendentes, supra quadrangulares, erecti, pulverulenti. *Folia* opposita phyllotaxi decussatae, inferiora semper trifoliolata, ramorum apices versus sensim bifoliolata, interdum bifida, ultimatim

unifoliolata; foliola ovata vel lanceolato-ovata, membranacea, basi rotundata vel late acuta, interdum plus minusve inaequalia, saepe breviter attenuata, apice acuta vel (obtuse vel subacute) acuminata, marginibus integra vel repande crenato-serrata, supra nervis excepti fere glabra, glandulosa, subtus pilis et glandulis sessilibus sparsis suffulta; costa et nervi secundarii utrinque subprominentes, nervi secundarii (3—) 5—7 (—8), angulo 30°—40° de costa adscendentes, tertiarii reticulati, inconspicui; petioli et petioluli gracillimi, teretes vel supra paulo canaliculati, pulverulenti. *Inflorescentiae* in foliorum axillis solitariae vel interdum binae (TEYSMANN 1768), ramorum apices versus cum earum foliis sensim minores et magis confertae, cymosae, dichasiales, bifurcatae, axibus pulverulentis et glandulosis, ramificationibus monochasialibus pseudoracemosis, saepe curvati (10—)15—25-floris; bracteae minutae, subulatae, persistentes, pedicellis suboppositae, cum pedicellis pulverulentae. *Calyx* campanulatus, 5-costatus, margine minute 5-denticulatus, intus glaber, extus praecipue basi pubescens et glandulosus, in fructu persistens. *Corolla* subbilabiata, extus praecipue lobis pubescens et glandulosa, intus fauce sub labio superiore pilosa excepta glabra, labium superius bifidum, inferius trifidum lobo medio longiore. *Stamina* 4 subaequalia, fauce vel tubi parti superiore inserta; filamenta basi pilosa et glandulosa, apice glabra; antherae ovoideae, maturae divaricatae. *Ovarium* subglobosum, dense glandulosum, 2-loculatum, loculi 2-ovulati, ovula apotropa, loculi apice affixa. *Fructus* drupaceus depresso-globosus, 4-pyrenus.

Shrub or undershrub, 0.2—1 m high. Branches ascendent below, erect in the upper part, 0.4—0.6 cm thick at base, the older parts woody, terete or slightly quadrangular, with a coarse cortex, light grey- to yellowish brown, the younger parts always distinctly quadrangular, very short brown-pulverulent. *Leaves* opposite, decussate, the lower ones always trifoliolate, towards the tips of the branches with transitions into bifoliolate, sometimes bifid and finally simple leaves; simple leaves and leaflets ovate to lanceolate-ovate, or in the transitional zone to some degree bifid, 3—9 × 0.5—4 cm, membranous, base rotundate to broadly acute, sometimes more less asymmetrical, often shortly attenuate, apex rather variable, either acute or acuminate (rarely emarginate), the acumen blunt or subacute, margins entire or more or less irregularly crenate-serrate; upper side almost glabrous, with scattered glands between the nerves, which are minutely pubescent and more or less reddish, lower side sparsely pubescent with scattered red or white sessile glands, nerves pubescent; midrib and secondary nerves somewhat prominent at both surfaces, secondary nerves (3—) 5—7 (—8) ascending at an angle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of 30°—40°, tertiary nerves reticulate, almost inconspicuous; petioles and petiolules brown, very slender, terete or slightly furrowed above, pulverulent, 1.7—5 cm long, petiolules of the terminal leaflets 0.5—2 cm, those of the lateral ones 0.1—0.4 (—0.6) cm long. *Inflorescences* single or more rarely (TEYSMANN 1768) two in the leaf-axils, 1.5—5 (—6) cm long, towards the tips of the branchlets gradually smaller, as are the leaves, and somewhat closer together, cymose, dichasial, bifurcate, the axes and pedicels pulverulent and with scattered glands, the two terminal ramifications monochasial, pseudoracemose, usually curved, bearing (10—) 15—25 flowers; peduncles (0.5—) 1—1.3 cm long; bracts subulate persistent, subopposite the pedicels, about 0.05 cm long, pulverulent and glandular as are the pedicels which are 0.05 cm long. *Calyx* campanulate, green in a living state, brown when dry, 0.15—0.17 cm long, 0.1—0.13 cm broad, 5-ribbed, the rim with 5 very short blunt teeth at the end of the ribs, glabrous within, at base pubescent and glandular as are the pedicels, almost glabrous and without glands towards the rim, in fruit persistent and membranous, light brown, semiglobose, and subtruncate, 0.15—0.2 × 0.9—1.6 cm. *Corolla* zygomorphous, indistinctly bilabiate, the tube about 0.2 cm long, the upper lip light yellow, 0.1 cm, consisting of two oblong-ovate lobes, lower lip 3-lobed, the middle lobe larger, orbiculate, 0.17 cm in diam., white with a yellow base, the lateral ones smaller (but larger than the lobes of the upper lip), ovate, 0.12 cm long, pale yellow; tube and lobes pubescent and glandular without, the glands more crowded towards the tips of the lobes, glabrous inside, except a narrow strip in the throat at the base of the lower lip. *Stamens* 4, subequal, inserted in the throat or in the upper half of the corolla tube, hardly or not exsert, filaments light yellow, densely pilose and with glandular hairs at base, glabrous towards the tips, anthers brown, ovoid, when ripe divaricate below, dehiscing with a large ovate slit. *Ovary* subglobose, entirely covered with glands, 2-celled, each cell with two ovules, inserted at the angles of the carpel margins, which are curved inward and in the upper part of the cell, descendant, apotropous; style filiform with two very short rounded stigmata, 0.23 cm long (ovary inclusive). *Fruit* drupaceous,

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Fig. 1 — *Vitex cymarioides*, n. sp. — *a.* habit; *b.* leaf-types; *c.* infrutescences; *d.* part of inflorescence without flowers so as to show pedicels and bracts; *e.* part of lower side of leaf; *f.* flower; *g.* calyx; *h.* flower, inside; *k.* anthers; *m.* stamen; *n.* ovary, longitudinal section; *p.* ditto, cross-section; *r.* fruit, side-view; *s.* ditto, top view. — after type specimen, except *c.* (KARTA 28).

depressedly globose, 0.15—0.2 cm in diam., 0.1—0.17 cm high, grey-brown, glandular, exsert from the persistent calyx, with 4 pyrenes, brown and very hard when dry. All colour indications f. BACKER.

Distribution.

JAVA, Madoera, Goenoeng Geger: TEYSMANN 1750 (Herb. Buitenzorg), nat. name: meneer-meneeran — Bawean, Goenoeng Toenggangan: KARTA 28 (Herb. Buitenzorg, Herb. Leiden), fr. on 6. 5. 1928, nat. name: rokoh-rokoh; without further indication of locality: TEYSMANN 1768 (Herb. Buitenzorg) — Kangean Archipelago, Poeloe Sepandjang, 1 m alt., in heterogeneous forest on heavy black soil behind the tidal forest, frequent, often consociately growing: BACKER 28867 (*Type specimen* in Herb. Leiden; paratypes in Herb. Leiden, Buitenzorg, Kew, Paris and Manilla), fl. and fr. on 21. 4. 1919.

Remarks. Vitex cymarioides strikingly resembles *Cymaria acuminata* DECNE. (*Labiatae-Ajugoideae*) from E. Java, Timor, Celebes, Mindanao and Luzon, particularly in its general habit (small shrub) and in the shape of the leaves and of the inflorescences, the extremely monochasial branches of which are quite unusual for the Verbenaceae. It therefore seems to be one of the most perfect links between the Labiatae and the Verbenaceae (in the orthodox delimitation of these families), thusfar known. In his important study on these closely related orders, JUNELL [1]) stated (l. c., pp. 210—213), that there is hardly a single feature or a combination of features to be found, by which the two families can be separated, except perhaps on the basis of the placentation, with which differences in the morphology of the inflorescences seem to be correlated. JUNELL's subdivision of the Verbenaceae-Labiatae is based upon the following points: *Verbenaceae* (new style): ovules attached at the margins of the carpels; inflorescences racemose (this delimitation include the former Verbenaceae-Verbenoideae; the tribus Stilboideae is raised to the rank of the natural order Stilbinaceae). *Labiatae* (new style): ovules attached at the inner surface of the carpels; inflorescences cymose (this delimitation comprises the former Labiatae and the Verbenaceae-Viticoideae, -Caryopteridoideae, -Symphoremoideae and -Avicennioideae). It seems to us that the placentation hardly yields a sufficient character for a family-distinction; it might rather be suitable for distinguishing subfamilies, or even smaller units, as the nature of the placentation feature implies the possibility that transitional forms between the two types may still be found. As far as the inflorescences are concerned, these yield a character which perhaps seems to be both somewhat more settling and — which is also important in practical classification — also more easily to be examined. However, there is one point in the delimitation of the whole group, which seems to have remained insufficiently stipulated thusfar; that is that we may distinguish between a group comprising mainly herbs, undershrubs or small shrubs (Labiatae, Verbenaceae-Verbenoideae) and another, including mainly large shrubs, lianas or trees (the other tribes of the Verbenaceae, old style). We do not mean to say that this feature may be used as a basis of a subdivision, as it would be certainly easy to indicate a number of transitional forms. We would only emphasize that this apparently natural subdivision, which is comparable with HUTCHINSON's subdivision of the Polycarpicae (The Families of Flowering Plants, I, 1926) and with such a relation as exists between the Umbelliferae and the Araliaceae, leads to a subdivision, which is almost a counterpart to that of JUNELL; it seems to be correlated with the characters: leaf margins entire or serrate: 1. *Herbs* and small shrubs, with mostly *serrate* leaf margins: Labiatae (old style), Verbenaceae-Verbenoideae, 2. Large shrubs, lianas and *trees* with usually *entire* leaf margins: the other tribes of the Verbenaceae (old style), except the Stilboideae (separate family).

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[1]) S. JUNELL, Zur Gynäceummorphologie und Systematik der Verbenaceen und Labiaten. Symb. Bot. Ups. 4, 1934.

This only confirms the very close relations between the two families (old style).

Returning to *Vitex cymarioides* it may be stated that its principal characteristics are of the following nature:

Feature	Resemblance
Habit	Verbenaceae-Verbenoideae Labiatae in general *Cymaria* (Lab.)
Leaves	
trifoliolate	*Vitex*
simple	Labiatae; some *Vitex* species e. g. *V. trifolia* L.
margins	Labiatae; in *Vitex* serrate leaves are very rare
Inflorescences	*Cymaria acuminata* DECNE; a slight tendency to monochasial lateral ramifications is found in some East-African *Vitex*-species (specifically unidentified in Herb. Leiden), somewhat stronger in *Vitex siamica* WILLIAMS from Siam and Malaya, which by transitional forms obviously shows that these monochasia have to be considered as reduced dichasia. A similar tendency may

	to some extent also be found in *Amethystea coerulea* L. (Labiatae-Ajugoideae; holarctic).
Flower	*Vitex*
Fruit	*Vitex*

This combination of features makes the creation of a new genus (intermediate between *Cymaria* and *Vitex*) both unnecessary and undesirable, since the only generic point of distinction would be its habit. The fact, however, that it is, as far as we know, by far the smallest and the least woody *Vitex,* makes us inclined to return to the opinions of Briquet of Baillon (quoted in Junell, l. c.) that the old style Verbenaceae and Labiatae have perhaps better to be considered as subfamilies of the same natural order, with the modification that these subfamilies should correspond with Junell's delimitation.

ON TWO NEW OR NOTEWORTHY SAPOTACEAE FROM CHINA

by

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(Rijksherbarium, Leiden)

(Issued June 15, 1939).

Madhuca Gmel.

M. (sect. *Dasyaulus*) **subquincuncialis** H. J. Lam & D. A. Kerpel, nova species. — *Fig. 1.*

Arbor mediocris. *Ramuli* teretes, novelli griseo-fulvo-tomentosi. *Stipulae* subulatae, caducae, pubescentes, 0.2 cm longae. *Folia* subcoriacea, obovata, basi cuneata, apice breviter obtuseque acuminata vel rotundata vel rare paulo emarginata, 5—10 × 2.5—4.5 cm, subtus minute sparse adpresse ferrugineo-tomentosa, ultimatim glabrata; petioli graciles, supra sulcati, 1.3—2 cm longi; costa media subtus praecipue folii basi prominens, nervi secundarii graciles, utrinque 11—14, angulo 65°—75° de costa adscendentes; nervi tertiarii pergraciles, typo § *Dasyauli*, i. e. prope marginem laxe reticulati, prope costam uno vel nonnullis nervis secundariis brevibus adscendentibus. *Flores* solitarii vel bini in foliorum axillis; pedicelli graciles, sub calyce paulo incrassati, griseo-fulvo-tomentosi, per anthesin 1.4—3, in fructu 2.5—3 (—3.5) cm longi; calyx 0.6—0.7 cm altus plerumque biserialis sepalis 2 exterioribus valvata vel aperta, inferioribus 2 imbricata, haud rare tamen 5-merus quasi-quincuncialis; sepala ovata extus dense ferrugineo-villosa, intus paulo adpresse tomentosa, 0.5—0.63 cm longa, 0.4—0.5 cm lata; corolla glabra, 0.3 cm exserta, 0.6—0.7 cm longa, tubo infundibuliformi 0.15 cm alto, petalis 8 (an semper?) oblongis, 0.45—0.55 × 0.1—0.15 cm, apices versus angustatis obtusis; stamina 16 (an semper?) uniserialia, glabra, filamentis 0.1 cm longis, antheris lanceolatis acutis 0.25 × 0.1 cm, basidorsifixis, extrorsis; ovarium subglobosum 0.1—0.2 cm diam., 0.1—0.13 cm altum, cum styli basi hispido-pilosum, (6—)7-loculatum, in stylum 0.8 cm longum subulatum, supra glabrum contractum. *Fructus* calyce persistente, i. s. ferrugineo-tomentosus, ovatus, apice in stylum

persistentem 0.8—1.2 cm longum subabrupte contractus, 2—2.5 cm longus, circ. 1.3 cm diam.; semen (unum tantum vidimus) testa brunnea nitida, 1.2 × 0.5 cm, cicatrice longa angustaque; embryo ignotum.

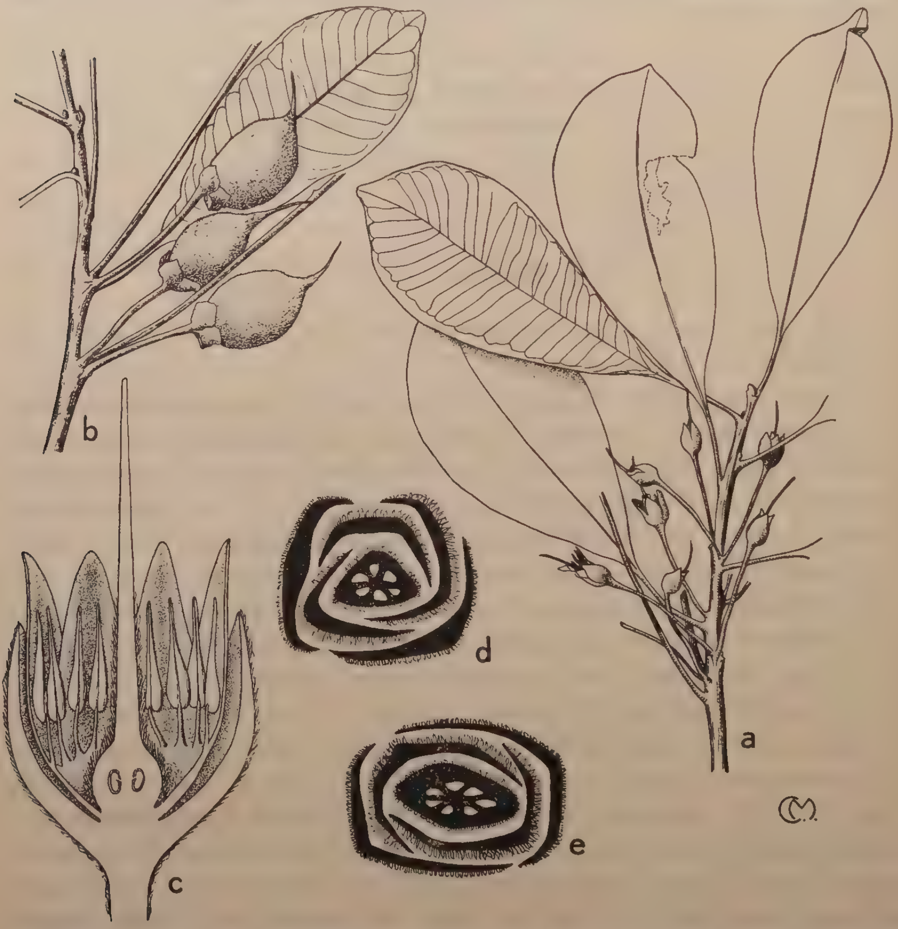

Fig. 1 — *Madhuca subquincuncialis*, n. sp. — a. branchlet and flowers; b. ditto with fruit; c. flower, longitudinal section; d. and e. cross-sections of ovary and calyx (two types) — a, c, d, e, after Wang 38520, b. after type specimen.

A tree, about 15 m high, with dark grey bark (f. Wang). *Branchlets* slender, terete, smooth, grey-brownish tomentose. *Stipules* subulate, caducous, pubescent, 0.2 cm. *Leaves* subcoriaceous, obovate, light brown when dry, 5—10 by 2.5—4.5 cm, base cuneate, apex rounded or bluntly acuminate, rarely slightly emarginate, sparsely tomentose underneath, ultimately glabrous; petioles slender, sulcate above, 1.3—2 cm long;

midrib prominent beneath, especially at the base of the leaf; secondary nerves 11—14, very slender, angle towards the midrib 65°—75°, tertiary ones almost inconspicuous, of the *Dasyaulus*-type. *Flowers* solitary or two in the leaf axils, the pedicels slender and tomentose, up to 3 cm long; calyx woolly pubescent, slightly tomentose within, 0.6—0.7 cm long, sepals usually 4 in two whorls, not rarely 5 and then quasi-quincuncially arranged; corolla glabrous, 0.3 cm exsert, petals 8 (always?); stamens 16 (always?) in one whorl, glabrous, filaments short, anthers narrow and subulate; ovary subglobose, pilose as is the lower portion of the subulate style, (6—)7-celled, ovary 0.1—0.13 cm, style 0.8 cm. *Fruit* ovoid, tomentose, 2—2.5 by 1.3 cm, with permanent style and calyx; seed 1.2 by 0.5 cm, with long and narrow scar; embryo unknown.

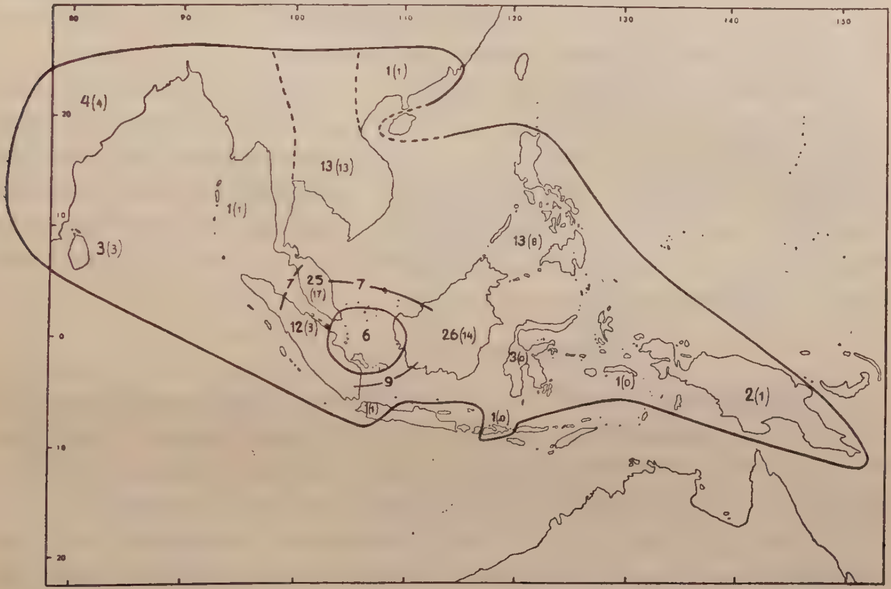

Fig. 2 — Area of the genus *Madhuca* — The numbers indicate numbers of species in each area, those between brackets show the number of endemics. In Western Malaysia some connections between Malaya, Sumatra and Borneo are indicated.

China, Kwantung, Yang-Ch'un (Yeungchun), in mixed woods: C. Wang 38520 (Herb. Sun Yatsen Univ., Canton; Herb. Leiden), tree to 15 m, flow. white, in Oct. 1935; in light woods: Id., 38801 (*type specimen,* in Herb. Canton and Herb. Leiden), bark grey, fruit green, brown glaucous, flow. and fr. in Nov. 1935 — Ts'ing-yuen, in forest: F. C. How 74147 (Herb. Canton; Herb. Leiden), tree 7 m, leaves lustrous green, subcoriaceous, flower buds ferruginously tomentose, in Sept. 1936 — Kwangsi, no locality mentioned: R. C. Ching 8277 and 8099 (Herb. Nanking; Herb. Canton), flowers in Oct. 1928.

Remarks: This is the first record of *Madhuca* in China. The localities have been located with the paper by F. A. McClure, Outline maps of Kwantung Province, etc. (Lingnan Science Journal **12**, 1933, 367—380). The generic area boundary on the map, published by me in "The Gardens' Bulletin, Straits Settlements" IX, 1935, 109, has therefore to be extended as is shown on *fig. 2.* I avail myself of this opportunity to correct another mistake in that map so as to include New Guinea in the area of *Madhuca.* It moreover shows the number of species known in various parts of the area, with the number of endemics in brackets and the number of species in common in Malaya, Sumatra and Borneo. The total number of species known now amounts to 80.

Concerning the number of carpels, it perfectly fits into the considerations given in my earlier paper, being 6—7. As to the unusual bearing of the calyx, it is the only *Madhuca*-species in which the calyx is not always biseriate (cf. *Diploknema*), unless *Diploknema ramiflora* should be considered a representative of *Madhuca.* It does therefore demonstrate once more the mutual independency of features, as this one is to be considered as a primitive one.

Planchonella Pierre.

P. pedunculata (Hemsl.) H. J. Lam & D. A. Kerpel, nov. comb. — *Sarcosperma pedunculatum (pedunculata)* Hemsley, Journ. Linn. Soc. **26**, 1840, 68 — *Sideroxylon pedunculatum* (Hemsl.) Merr., MS. — *Sarcosperma pedunculatum* Hance (nomen in schedula). — *Fig. 3.*

In the "Revision of the Sarcospermataceae" published with the collaboration of W. W. Varossieau (Blumea **3**, 1938, 198), it was suggested that the species would be a representative of *Sideroxylon.* On closer examination, however, it appeared that an insertion into *Planchonella* is more probable, since the seed possess a long and relatively narrow scar. As this species is practically unknown, we are giving here a new description, as complete as the material available affords.

Tree, 9—12 m high, stem about 0.3 m in diam., bark grey to dark grey (f. Ching). *Branchlets* densely foliate, terete, dark brown, about 0.4 cm in diam., the younger parts densely lenticellate. *Stipules* none. *Leaves* alternate, glabrous, more or less shining above, rigid-coriaceous, bright green above, pale below (f. Ching), often greenish when dry, narrowly ovate to ovate-lanceolate, base attenuate, apex tapering into a rather long and narrow but blunt acumen, (5—) 8—9 cm long, 3—4 cm broad, petioles furrowed above, keeled below; midrib prominent below; secondary nerves very slender, (8—) 10—12, slightly curved towards the margins, ascending at an angle of 50°—70° with the midrib; tertiary nerves almost inconspicuous, in general transverse and perpendicular to the midrib. *Inflorescences* fasciculate, usually inserted along short and ferruginously pubescent axillary shoots, 1—3-florous but often close together, peduncles 1.5—2 cm long, 0.05 cm thick, pedicels 0.3—0.4 cm long, bracts if any minute. *Flowers* hermaphroditic. *Calyx* 5-merous, sepals imbricate and quincuncial, ferruginously pubescent without, glabrous within, deltoid, or subovate, blunt, 0.3 × 0.25 cm. *Corolla* yellowish (f. CHING), tube cylindrical, 0.2—0.25 cm long, 0.125 cm broad, petals 4 (—5), 0.2 × 0.125 cm, oblong-ovate. *Staminodes* 4 (—5), lanceolate, 0.15 cm long. *Stamens* 4(—5), 0.2 cm long, anthers 0.05 × 0.025 cm, sagittate-cordate, dorsifix, extrorse, with bifid apex. Ovary 4(—5)-celled, entirely glabrous, subglobose, 0.125 × 0.1 cm, narrowing into a subulate style, which is 0.25 cm long. *Fruit* (only one examined) 1-seeded, striate, glabrous, ovoid with curved acuminate apex, 2.5 × 1.5 × 0.9 cm, persistent style 1 cm long. *Seed* 1.6 × 0.9 × 0.6 cm, testa very shining, brown, scar narrowly ovate, 1.1 × 0.4 cm, rather rough, dull, greyish brown. *Embryo* unknown.

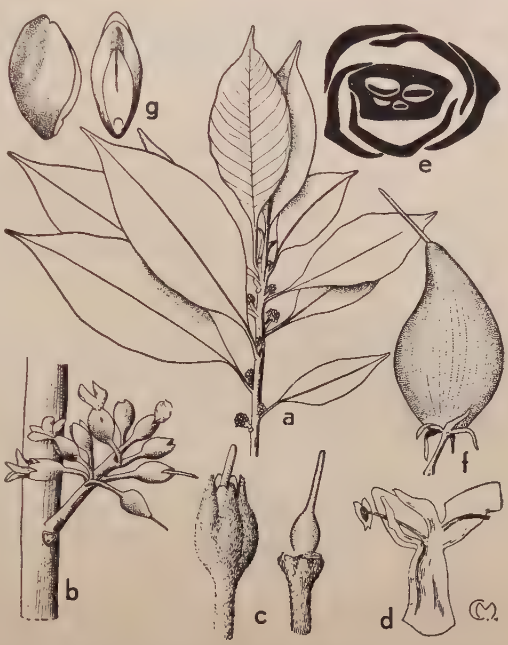

Fig. 3 — *Planchonella pedunculata* (HEMSL.) H. J. LAM & D. A. KERPEL, n. comb. — a. branchlet with very young inflorescences; b. adult inflorescence; c. flower bud and ovary; d. part of corolla within; e. cross-section of calyx and ovary; f. fruit; g. seed, lateral and ventral side. — After WANG (for CHUN) 498.

FRENCH INDO-CHINA, Cochinchina, Giaray: POILANE 2540 (Herb. Paris & Herb. Arn. Arb.), fr. 13. 2. 1921 — Annam, Vinh, Sông Cou, Liu Ca, 390 m alt.: POILANE 16477 (Herb. Arn. Arb.), 27. 7. 1929.

CHINA, Kwangsi, Tia Lian Shan, Luchen N., in wood, alt. 1800 ft.: R. C. CHING 5316 and 5353 (Herb. Arn. Arb. and Herb. Nanking), a tree of dense foliage, 30—40 ft. high, stem 1 ft. in diam., very common in forest, leaves thick, lustrous green above, pale below, grey bark, flow. yellowish, 25. 5. 1928 — Kwantung, North River Region, Fung Wan, near rocks: TO KANG PENG, TS'ANG WAI TAK and TS'ANG UN KIN, C. C. C.-Herb. 12855 (Herb. Arn. Arb.), young fr. 13—18. 7. 1924; ID. (U.S.A. Nat. Herb. 1248065); Lung T'au Shan, Fungwanhui, near rocks: TO and TS'ANG, C.C.C.-Herb. 12855 (Herb. Paris & Herb. Lingnan Un.), 14. 7. 1924; West River, Yan Fou District, Lu Tse Tsun, Rocky mountain: WANG (for W. Y. CHUN) 498 (Herb. Arn. Arb., Herb. Sun Yatsen Un. and Herb. Leiden), young flow., 24. 1. 1928; without further indication of locality: C. FORD 246 (*Type specimen*, Herb. Kew, photogr. in Herb. Leiden), young fr. Aug. 1887.

Remarks. This species is an excellent example for the complexity with which specific characters are distributed in related genera and even families. The most remarkable feature seems to be that the flowers are usually 4-merous except the calyx (?), and particularly that the inflorescences are pedunculate, a primitive condition, very rare in the Sapotaceae, and still left as a normal feature in the Sarcospermataceae. BAEHNI (Candollea, 7, 1938, 488) mentions a similar case in *Pouteria lateriflora,* which I do not know.

ADDITIONAL NOTES ON SARCOSPERMA

by

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(Issued June 15, 1939).

The present records are mainly based upon the collections by C. W. Wang in Yunnan, 1936. We are indebted to Dr E. D. Merrill, Harvard University, Jamaica Plain, Mass., U.S.A., for putting these specimens to our disposal. Except for a few points, our views concerning the genus have not been essentially modified. The data mentioned are supplementary to those, published in our earlier paper: Revision of the Sarcospermataceae (Blumea **3**, 1938, 183—200).

1. **S. kachinense** (King & Prain) Exell — *S. tomentosum* H. H. Hu (ex comm. E. D. Merrill).

China, Yunnan, Lung-huk, Jenn-yeh Hsien, in mountain woods, 920 m alt.: C. W. Wang 80219 (Peiping, H), woody plant, height 5 ft, diam. 3 inch., flowers yellow in Oct. — Maan-tsang, Sheau-meng-yeang, Luh-shuen Hsien, 1000 m alt., mixed forests: Id. 81095 (Peip., H), height 2.7 m, flow. buds in Nov. — Nan-hsien-ho, Cheli Hsien, 800 m alt., river side: Id. 79500 (Peip., H), height 2 m, flowers green-white, in Oct.; Id. 79518 (Peip., H), height 4 m, flowers green-white, in Oct. — Kuen-ger, Che-li Hsien, in mixed forest, 1200 m alt.: Id. 79413 (Peip., H), height 7 m, diam. 15 inch., flower buds in Oct.; Id. 79401 (Peip., H), height 2 m, flowers greenish white, both on trunk and on branches, Oct. — Fo-Hai, in thickets in ravine, 1080 m alt.: Id. 74931 (Peip., H), height 40′, diam. 2′, flower buds in July — Meng-la, Jenn-yeh Hsien, mixed woods, 900 m alt.: Id. 80673 (Peip., H), height 25′, flowers green, in Nov.; border of woods, 900 m alt.: Id. 80710 (Peip., H), height 20′, flowers yellowish, in Nov.

Remarks: The specimens quoted are hailing from mostly small trees (or shrubs?); one tree is mentioned to have a trunk with a diam. of as much as 2′. Flowers in October-November.

Although the variability of this species appears to be somewhat greater than was accepted earlier — the pubescence of leaves and inflorescences is getting sometimes less woolly with age — the species remains a well-distinct one. Some of the specimens quoted above are tending towards *S. arboreum,* but apart from their general appearance (leaves often greenish when dry), they may always be distinguished by their auricles, a feature hitherto not yet found in a specimen which is characteristically *S. arboreum.* The area of *S. kachinense* is not essentially changed by the above records, as far as I can locate the localities.

2. **S. paniculatum** (KING) STAPF & KING.

CELEBES, South-Celebes, Tassosso (prob. recte: Tasese, distr. Soenggoeminasa, nr. Makasar): WARBURG 16610 (B, H), A° 1888.

This is an extension to the discontinuous area of this species.

3. **S. arboreum** HOOK. f.

CHINA, Yunnan, Nan-hsien-ho, Che-li Hsien, mixed forest, 800 m in alt.: C. W. WANG 79491 (Peip., H), height 7 m, diam. 5 inch., flowers green-white, in Oct. — Kuen-ger, Che-li Hsien, in thickets, 900 m in alt.: ID. 79218 (Peip., H), height 8 m, diam. 8 inch., flower buds green, in Oct., wood yellowish white.

5. **S. laurinum** HOOK. f.

CHINA, Hainan, in forests: S. K. LAU 27687 (H), tree 9 m, flow. pale yellow.

6. **S. Griffithii** HOOK. f. — *S. cheliense* H. H. HU (ex comm. E. D. MERRILL).

CHINA, Yunnan, Meng-Soong, Dah-meng-lung, Che-li Hsien, frequent, in mixed forest, 1900 m alt.: C. W. WANG 78348 (Peip., H), height 25′, diam. 10 inch., flowers greenish white, in Sept.; ID. 78276 (Peip., H), height 30′, diam. 1′, flower buds greenish, in Sept.

Remarks. Trees up to about 10 m high and 30 cm in diam. Flowers in September.

This is the first record of the species in China; the area is therefore larger than was supposed in our "Revision".

TWO NEW SPECIES OF MERREMIA FROM FIJI, REPRESENTATIVES OF A NEW SECTION, WAVULA (CONVOLVULACEAE)

by

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(Issued June 15, 1939).

1. **Merremia pacifica** van Ooststr., nov. spec.; fig. 1, *a—g*.

Scandens, ramis teretibus, fistulosis, laevibus, glabris, ad 5 mm diam.; foliis petiolatis, petiolo 5 cm longo, glabro vel praesertim parte superiore pilis nonnullis brevissimis appressis praedito, herbaceis, late ovatis vel orbicularibus, apice abrupte acuminatis vel cuspidatis, acumine acuto mucronulato, 1.5—2 cm longo, basi leviter cordatis, 11—12 cm longis, 10—11 cm latis, glabris vel basi superne ad insertionem petioli pilis nonnullis brevissimis praeditis; nervis primariis utrinque 9—10, curvatis, subtus prominentibus, secundariis pluribus subparallelis, tertiariis subtus reticulatis supra indistinctis; inflorescentiis axillaribus 15—20 cm longis, pedunculis teretibus, glabris vel basi pilis nonnullis brevissimis praeditis, 10—13 cm longis, apice ramosis, ramis brevissimis 3—5 mm longis, ergo floribus ad apicem pedunculi subaggregatis subumbellatis; bracteis probabiliter minutis, mox deciduis, in specimine descripto non praestantibus; pedicellis 3—3.5 cm longis, glabris, longitudinaliter striatis vel subangulosis, apice sub calyce annulo crasso undulato praeditis; sepalis aequilongis vel exterioribus paullo brevioribus, membranaceis, intus glandulis punctiformibus praeditis, ad 12 mm longis (vel exterioribus 8—9 mm longis), exterioribus obovatis, apice rotundatis vel retusis, mucronulatis, interioribus plerumque latioribus obovatis vel late obovatis, retusis, mucronulatis; corolla alba, campanulata vel infundibuliforme, circ. 3 cm longa, limbo sublobato, glabra; filamentis brevibus, 5 mm supra basin corollae insertis, 5 mm longis, basi valde dilatatis, plus minusve papillosis, antheris 2.5 mm longis, glabris; ovario conico, glabro; stylo glabro, circ. 10 mm longo, stigmatibus globosis, papillosis.

Fiji Islands, Vanua Levu, Mbua, southern slope of Mount Seatura, alt. 400 m, a high-climbing vine in dense forest, A. C. Smith

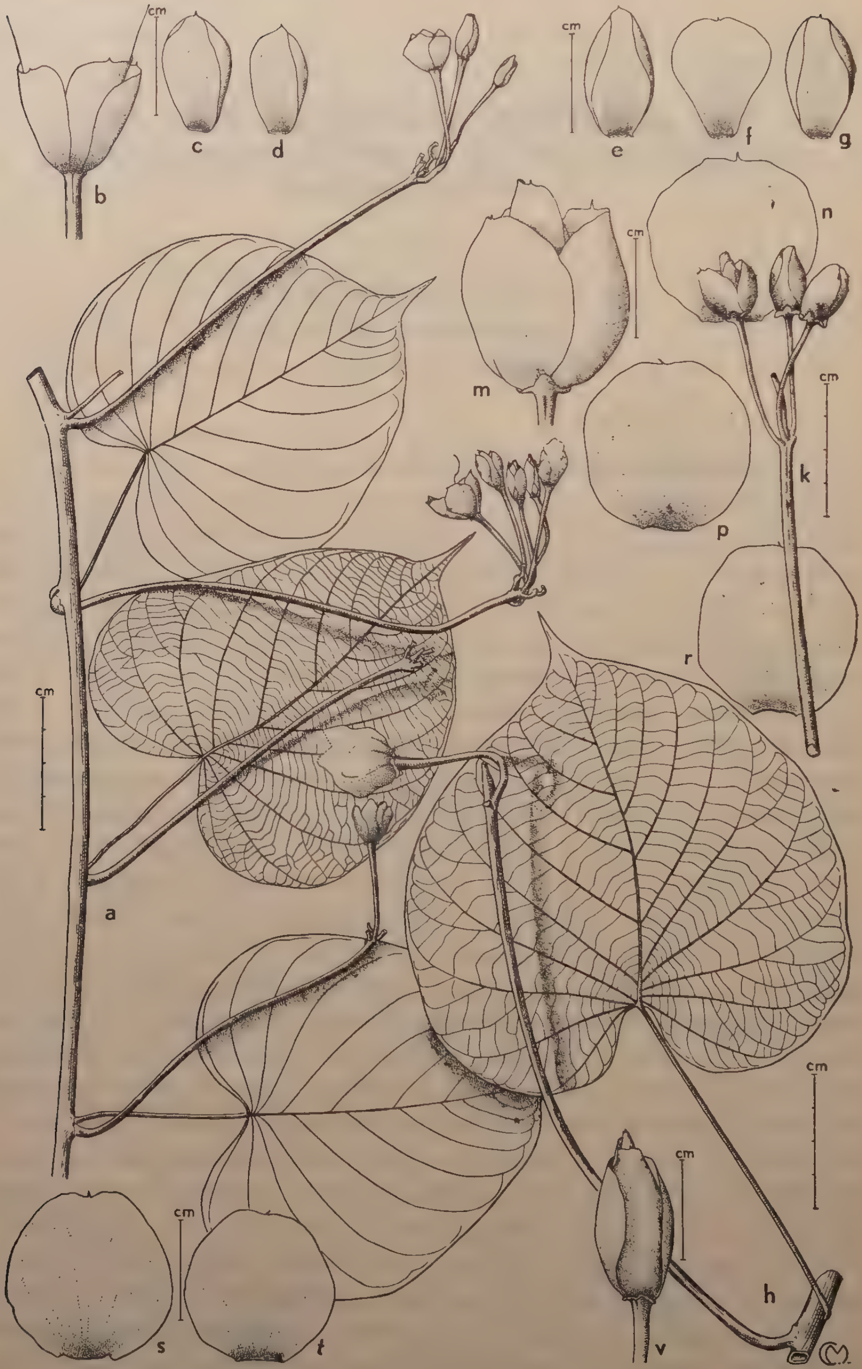

Fig. 1.

1690, Apr. 27, 28, 1934, *type* in Herb. Leiden; dupl. in Herb. Bernice P. Bishop Museum and in Herb. New York Botanical Garden.

Vernacular name: veliyawa.

2. **Merremia calyculata** VAN OOSTSTR., nov. spec.; fig. 1, *h—t*.

Verisimiliter scandens; ramis teretibus, fistulosis, longitudinaliter striatis, glabris, brunneis, ad 7 mm diam.; foliis petiolatis, petiolo circ. 10—13 cm longo, gracili, glabro, herbaceis, suborbicularibus, apice abrupte acuminatis, acumine acuto, mucronulato, 1.5—2 cm longo, basi late cordatis, 14—15 cm longis, 12—13 cm latis, subtus ad nervorum basalium axillas parce flavido-pilosis, ceterum glabris; nervo mediano nervis primariis subtus prominentibus, nervis primariis utrinque 10—11, marginem versus curvatis, nervis secundariis pluribus subparallelis, nervis tertiariis indistincte reticulatis; inflorescentiis axillaribus, ad circ. 25 cm longis, pedunculis teretibus, glabris, ad circ. 20 cm longis, apice parce ramosis, ramis brevibus ad 1 cm longis, ergo floribus apice pedunculi subaggregatis (in specimine descripto floribus juvenilibus 3); bracteis deciduis, in specimine descripto non praestantibus; pedicellis 3—4 cm longis, glabris, longitudinaliter striatis vel subangulosis, apice sub calyce in lobos circ. 4 parvos late triangulares obtusos calycem alterum (calyculum, epicalycem circ. 9 mm in diam.) simulantes productis; sepalis aequilongis, membranaceis, 17—20 mm longis, valde concavis, suborbicularibus, mucronulatis; corolla alba, basin versus intus lutea (SEEMANN), in floribus praestantibus valde juvenilibus ....

FIJI ISLANDS, Puna, B. SEEMANN 324, June 1860, *type* in Herb. Royal Bot. Gard. Kew.

Vernacular name: wavula.

Remarks: According to SEEMANN the flowers are "white, inside the base yellow".

From an examination of one of the young flower-buds it resulted that the corolla is glabrous outside, that the filaments are hairy at their base, that the anthers are straight in bud and almost 5 mm long, that the ovary and the style are glabrous and that the stigma is biglobular and papillose. Immediately below the calyx the pedicel bears some four small broadly triangular obtuse lobes, forming together a

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Fig. 1, *a—g: Merremia pacifica* VAN OOSTSTR.; *a*: type-specimen, A. C. SMITH 1690 (Leiden); *b*: calyx; *c—g*: sepals 1—5; *h—t*: *M. calyculata* VAN OOSTSTR.; *h*: part of type-specimen, B. SEEMANN 324 (Kew); *k*: peduncle with 3 young flowers; *m*: calyx; *n—t*: sepals 1—5; *v*: *M. similis* ELMER, calyx.

kind of epicalyx; this "epicalyx" has a diameter of about 9 mm in the type specimen. It is an interesting fact that *M. pacifica,* also from Fiji, has in the same manner a thick undulate ring below the calyx. A similar lobed ring occurs in

3. **M. similis** ELMER (fig. 1, *v*) from the Philippines.

As to the nature of these outgrowths I am still in uncertainty; it is possible that they represent a kind of extrafloral nectaries.

Besides this similarity the three species mentioned have still more points of resemblance viz. 1. their general habit, 2. the form and texture of the leaves; but especially 3. the subumbellate inflorescence, 4. the possession of remarkably long pedicels and 5. the form and texture of the sepals. They form in this way a well-defined group of species within the genus, a group to which I propose to give the rank of a section, under the name *Wavula.*

Sect. **Wavula** VAN OOSTSTR., nov. sect. [1])

Plantae alte scandentes, foliis late ovatis vel orbicularibus, cordatis, mediocris vel majoribus, inflorescentiis longe pedunculatis apice ramosis, ramis brevibus, ergo floribus subumbellatis; pedicellis longiusculis vel longis apice sub calyce annulo plusminusve lobato lobis crassis praeditis vel in lobos parvos calycem alterum (calyculum, epicalycem) formantes productis; alabastris ovoideis vel elongato-ovoideis, subacutis; corolla mediocri vel majore fasciis 5 mesopetalibus male limitatis, indistincte lineatis; sepalis valde concavis, tenuiter coriaceis vel potius membranaceis, late ellipticis vel orbicularibus, mediocribus vel majoribus.

Type species: *Merremia similis* ELMER.

This section seems to be closely related to the section *Xanthips* (GRISEB.) HALL. f. and in general shows certain resemblances to the well-known *Merremia umbellata,* especially as to the form of the inflorescences and the structure of the parts of the flower.

Key to the species of the section Wavula.

1c. Plant densely hairy. Sepals to 15—18 mm long. "Epicalyx" very small, consisting of a ring of small warts. *Philippine Islands* . 3. **M. similis** ELMER
b. Plant completely glabrous or only with few scattered hairs 2
2a. Sepals to 12 mm long. "Epicalyx" very small, consisting of a thick undulate ring. *Polynesia (Fiji Islands)* . . . . . . 1. **M. pacifica** VAN OOSTSTR.
b. Sepals 17—20 mm long. "Epicalyx" larger, consisting of broad-triangular, obtuse, flat lobes. *Polynesia (Fiji Islands)* . . 2. **M. calyculata** VAN OOSTSTR.

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[1]) *Wavula,* native name of *Merremia calyculata* n. sp.

THE CONVOLVULACEAE OF MALAYSIA, II [1]

by

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(Issued June 15, 1939).

The genera Jacquemontia, Aniseia, Convolvulus, Calystegia, Shutereia, Merremia, Operculina and Decalobanthus.

This is the second contribution to a series of papers dealing with the *Convolvulaceae* of Malaysia (Malay Peninsula and Archipelago, Philippine Islands and New Guinea). The genera worked out here belong to the tribe *Convolvuleae*; they are numbered VIII—XV. Genus VII, *Erycibe*, belonging to the *Erycibeae* shall be treated afterwards in a special monograph.

With regard to the geographic arrangement of the specimens mentioned, some alterations had to be introduced due to the new limitation of the residencies in the island of Java. The names and limits of these residencies are now brought into line with the data of the "Atlas van Tropisch Nederland" [2].

VIII. JACQUEMONTIA Choisy

Choisy in Mém. Soc. Phys. Genève VI (1833) p. 476; id. in DC., Prodr. IX (1845) p. 396; Benth. et Hook., Gen. Plant. II (1876) p. 874; Baill., Hist. Pl. X (1891) p. 324; Peter in Engl.-Prantl, Nat. Pfl. fam. IV, 3a (1891) p. 33; Hall.f. in Engl., Bot. Jahrb. XVI (1893) p. 578; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 498, 508; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 85; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 301; Koorders, Exk. fl. Java III (1912) p. 110; Ridley, Fl. Mal. Penins. II (1923) p. 456; Merrill,

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[1] Part I in Blumea III (1938) p. 62—94.

[2] Atlas van Tropisch Nederland, edited by the "Koninklijk Nederlandsch Aardrijkskundig Genootschap" (Royal Netherlands Geographic Society) and the "Topografische Dienst in Nederlandsch-Indië" (Topographical Service in the Netherlands Indies), 1938.

Enum. Philipp. Fl. Pl. III (1923) p. 359; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 513.

Herbaceous or woody twiners, rarely erect plants, generally hairy with stellate hairs, rarely glabrous. Leaves variable, often cordate at the base, entire, rarely dentate or lobed. Flowers in axillary umbel-like or capitate cymes, with or without an involucre, rarely in scorpioid cymes or solitary or in dense terminal spikes or capitules; bracts small, linear to lanceolate, or larger and foliaceous. Sepals 5, equal or more or less unequal, often with larger outer ones. Corolla medium-sized or small, funnel-shaped or campanulate, blue, lilac, pink or rarely white, with 5 distinctly limited midpetaline bands, the limb 5-toothed or nearly entire, rarely lobed. Stamens and style included. Pollen smooth. Style 1, filiform, stigmas 2, mostly elliptic or oblong and complanate, rarely linear or globose. Ovary 2-celled, 4-ovuled. Disk small or none. Fruit a globose capsule, 2-celled, 4- or 8-valved, 4- or less-seeded. Seeds smooth or minutely papillose, glabrous or velutinous, the angles often with a narrow scarious wing.

Distribution: The greater part of the species in tropical and subtropical America, a few species also in the tropical and subtropical parts of Africa, Asia and Australia.

Remarks. MEISSNER in Mart. Fl. Bras. VII (1869) subdivided the genus into 3 sections: 1. *Cymosae* MEISSN. l.c. p. 292, 294; 2. *Capitatae* MEISSN. l.c. p. 293, 302 and 3. *Anomalae (Heterogeneae)* MEISSN. l.c. p. 293, 306. A fourth section has been distinguished by the present author viz. 4. *Capituliflorae* VAN OOSTSTR. in Rec. Trav. Bot. Néerl. XXXIII (1936) p. 216. Only the *Cymosae* are represented in Malaysia.

Key to the species.

1a. Sepals unequal, two inner ones shorter [1]), all acute or acuminate (in one var. subobtuse). Ovary glabrous, stigmas filiform. Bracts small, 5 mm or less [2]). Herbaceous twiners 2

b. Sepals subequal, obtuse. Ovary pilose, stigmas subglobose. Woody twiner . . . . **3. J. tomentella**

2a. Two outer sepals ovate-lanceolate to ovate, acuminate at the apex, attenuate to the base (in var. *philippinensis* the outer sepals subobtuse, cuspidate or mucronulate, not distinctly acuminate) . . . . . . **1. J. paniculata**

b. Two outer sepals broad-ovate, acute to short-acuminate at the apex, cordate or rounded at the base . . . . **2. J. Zollingeri**

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[1]) Sepals unequal, outer ones shorter, obtuse. Cultivated species . . . . **5. J. Blanchetii**

[2]) Bracts longer, to 10 mm. Cultivated species . . . . . **4. J. pentantha**

1. **Jacquemontia paniculata** (Burm. f.) Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 541; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 95; id. in Bull. Herb. Boiss. V (1897) p. 382, 1010; id. in Jahrb. Hamb. Wiss. Anst. XV (1898) p. 42; Schum.-Lauterb., Fl. Deutsch. Schutzgeb., Nachtr. (1905) p. 369 (*J. panniculata*); Cooke, Fl. Bombay II (1905) p. 235; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 87; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 302; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 107; Koorders, Exk. fl. Java III (1912) p. 111; Koorders-Schum., Syst. Verz. (1910—13), Conv. p. 2; Merrill, Spec. Blanc. in Bur. of Sc. Publ. 12 (1918) p. 326; id. in Philipp. Journ. Sc. XIX (1921) p. 374; Gamble, Fl. Pres. Madras V (1923) p. 926; Ridley, Fl. Malay Penins. II (1923) p. 456; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 359; Rendle in Journ. Bot. LXIII, Suppl. (1925) p. 71; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 513 — *Ipomoea paniculata* Burm. f., Fl. Ind. (1768) p. 50, t. 21, fig. 3 — *Convolvulus parviflorus* Vahl, Symb. Bot. III (1794) p. 29, non Sal., non Desr.; Roxb., Fl. Ind. II (1824) p. 51 (*C. parviflorus* Willd.); Blume, Bijdr. (1825) p. 724; Roxb., Fl. Ind. I (1832) p. 471 (*C. parviflorus* Willd.); Choisy in Mém. Soc. Phys. Genève VI (1833) p. 480; Hassk., Cat. bog. alt. (1844) p. 139, excl. Ip. timor.; Choisy in DC., Prodr. IX (1845) p. 413; Zoll., Syst. Verz., 2. Heft (1854) p. 130; Miq., Fl. Ned. Ind. II (1857) p. 622; Benth., Fl. Austr. IV (1869) p. 430; v. Mueller, Descr. Notes Pap. Pl. IV (1876) p. 70; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 220; Hemsl., Rep. Chall. Bot. I, 3 (1884) p. 170; Vidal, Phan. Cuming. Philipp. (1885) p. 129 (not seen); Forbes, Wander., Germ. ed., II (1886) p. 222; Vidal, Rev. Plant. Vasc. Philipp. (1886) p. 197; Watt, Dict. Econ. Prod. II (1889) p. 519; Warb. in Engl., Bot. Jahrb. XIII (1891) p. 412; Trimen, Handb. Fl. Ceyl. III (1895) p. 226; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 509; Schum.-Lauterb., Fl. Deutsch. Schutzgeb. (1901) p. 518; Manson Bailey, Queensl. Fl. IV (1901) p. 1070; id., Compr. Cat. Queensl. Pl. (1909) p. 353; Gagnep. et Courch. in Lec., Fl. Indo-Chine IV (1915) p. 300, fig. 35 — *Ipomoea parviflora* (Vahl) Pers., Syn. I (1805) p. 183 — *Convolvulus multivalvis* var. β R. Br., Fl. Nov. Holl. ed. 1 (1810) p. 483 — *Jacquemontia umbellata* Boj., Hort. Maurit. (1837) p. 229 (not seen); Choisy in DC., Prodr. IX (1845) p. 397; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 509 — *Convolvulus valerianoides* Blanco, Fl. Filip. (1837) p. 90[1] — *C. boerhaavioides* Blanco,

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[1] According to Merrill, Spec. Blanc. (1918) p. 326.

l.c., ed. 2 (1845) p. 67 (not seen); ed. 3, I (1877) p. 125 [1]) — *Breweria valerianoides* F.-VILL., Novis App. (1880) p. 143 (not seen) [1]) — *Convolvulus paniculatus* (BURM. f.) O. K., Rev. gen. pl. (1891) p. 440; BOLD., Zakfl. Java (1916) n. 801.

Herbaceous twiner, 0.25—2.00 m (BACKER), young specimens erect or decumbent. Stems terete, slender, the young parts mostly finely hairy, afterwards glabrescent, occasionally the pubescence is dense in adult specimens. Leaves petiolate, petiole slender, finely pilose, 1 to 6 cm long, the blade ovate or ovate-oblong, mostly acuminate with mucronulate tip, sometimes acute to obtuse and mucronulate, more or less cordate or rounded to truncate at the base, 2—8 cm long and 1.5—5 cm broad, glabrous or short-pilose and glabrescent above and beneath; lateral nerves 5—8, arcuately connected near the margin. Peduncles more or less pubescent, axillary, variable in length, very short and only a few mm long or longer, to several cm, the flowers in a loose to very dense, few- to many-flowered umbelliform cymose inflorescence at their end; bracts small, subulate; pedicels filiform, pubescent, 3—6 mm, or longer after flowering-time. Sepals more or less pilose or nearly glabrous, unequal, the 3 outer ones of which the third one is often more or less oblique at the base, ovate-lanceolate to ovate, acuminate to long-acuminate with more or less waved top, attenuate to the base, herbaceous or the third one with a scarious margin at one side, 5—7 mm long, the 2 inner ones shorter, with broad-ovate to orbicular base, acuminate, 3—4.5 mm long, the base with a scarious margin. Corolla funnel-shaped, 5-lobed, glabrous, or with some hairs at the mucronulate top of the lobes, lilac, pale blue, lilac with white base or white, 8—10 mm long. Stamens subequal, the filaments inserted about 1.5 mm above the corolla base, pubescent at their broadened base. Ovary ovoid, glabrous. Style filiform with two filiform stigmas. Disk ring-shaped, yellow (BACKER). Capsule globular, 3—4 mm across, brown, glabrous, 2-celled, 8-valved, the valves lanceolate, acute. Seeds 4 or less, brownish yellow to purplish black, minutely verrucose, glabrous, 1.5—2 mm long, the angles with a very narrow scarious wing.

MALAY PENINSULA, Perlis, Gua Nangka, HENDERSON, Singapore Field n. 23071, Nov. 1929 (S, mixed with *Merremia umbellata* (L.) HALL. f.); Bukit Lagi, RIDLEY 14900a, March 1910 (K, S); Kedah, P. Langkawi, Batu Ayam, Selat Panchor, c. 100 ft., on limestone, HENDERSON, Singapore Field n. 28941, Nov. 1934 (B, S); Perak, Kuala Kangsar, HANIFF, Singapore Field n. 14996, Jan. 1925 (S); Kampong Kota, WRAY Jr. 3337, Febr. 1883 (S).

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[1]) According to MERRILL, Spec. Blanc. (1918) p. 326.

Sumatra, without precise locality, Korthals 132 (L); Atjeh and Dependencies, Poeloe We, Buitendijk s.n., May 1914 (L); East Coast, Batoebara, Yates 2233 (B, L); West Coast, Fort van der Capellen, Matthew s.n., Jan. 1913 (K); Lampoengs, Gedong-tetahan, 400 ft., Forbes 1287 c (BD, L).

Java, according to Backer in West and East Java in the lower parts, in fields, on shrubs and hedges. Without precise locality, Blume s.n. (L, U); Horsfield s.n. (L, U); Nagel or Nagler 181 (BD); Ploem s.n. (B); Bantam, above Lebak, Kuhl and van Hasselt 76, Aug. (L); Tjilangkahan, Hasskarl s.n. (L); between Pasir Ajoenam and Tjipanas, c. 200 m, Backer 2018, June 1911 (B); Batavia, Batavia, Blume 1169 (L); beach near Pakapoeran, Scheffer s.n., Aug. 1871 (B); Tandjong Priok, Raap 492, June 1894 (L); id., grassy places and thickets near the beach, Hallier s.n., Febr. 1896 (B); West of Tandjong Priok, Backer 31815, May 1903 (B); Weltevreden, Backer 31816, July 1903 (B); Kramat Sentiong, S. of Weltevreden, field, Backer 31812, Oct. 1902 (B); Meester Cornelis, thickets along Kali Baroe, Backer 31813, July 1903 (B); Bidaratjina, Edeling s.n. (B); Kebajoran, Backer 31814, July 1904 (B); Tjikoja, Blume s.n. (L); near Tjikoja and Lamadjang, Zollinger 170 (BD); east of Pangipiran, c. 250 m, thickets, van Steenis 5446, July 1933 (B); Poerwakarta, 150 m, wayside, van Slooten 437, July 1920 (B); south of Poerwakarta, 200 m, thickets, Backer 13827, June 1914 (B); Tjikoempai, east of Poerwakarta, c. 110 m, Harmsen 54, Aug. 1921 (B); id., Harmsen 128, Dec. 1921 (B, a cultivated specimen); Buitenzorg, cultivated in the Botanic Garden, Teysmann (L); id., XV. K. B. X. 7 (B); Kiara Pajoeng, north of Tjiandjoer, 500—600 m, in Hevea-plantation, Zwaardemaker 87, May 1918 (B); Pelaboehanratoe, Boerlage s.n., July (L); Priangan, Rawah Lakbok, south of Tjikawoeng, thickets, 40 m, Backer 4325, Aug. 1912 (B); Bandjar, Hevea-garden, 40 m, Backer 4213, Aug. 1912 (B); Cheribon, between Haoergeulis and Tjipoenagara, 25 m, Backer 16847, Oct. 1914 (B); Pekalongan, Brebes, Backer 15346, Sept. 1914 (B); Soebah, Koorders 36997 β, May 1899 (B, L); id., teak-wood, on red volcanic soil, Beumée 4309, July 1919 (B); Kedoe, Gombong, van Hardenberg s.n. (B); Semarang, Semarang, de Visser Smits s.n. (B); Tjandi, c. 60 m, alang-field, Docters van Leeuwen 596, July 1912 (B); virgin forest Kerto near Kedoengdjati, Koorders 28094 β, June 1897 (B); virgin forest near Kenteng, Kedoengdjati, Koorders 25207 β, Sept. 1896 (B); Kedoengdjati, Koorders 28232 β, June 1897 (B, L); id., Koorders 25354 β, Sept. 1896 (B); Grobogan, S. Kradenan, teak-wood, c. 75 m, de Boer 28, June (B); Randoesari, c. 15 m, dry grassy places, Lörzing 1689, June 1914 (B); Djapara-Rembang, Ngarengan, Koorders 33508 β, May 1899 (B); id., Koorders 33514 β, May 1899 (B, L); id., Koorders 33511 β, May 1899 (B, L); Ngawen, teak-wood, on marl, c. 100 m, Beumée 5252, Aug. 1920 (B); id., Beumée 5288, Aug. 1920 (B); Bekoetoek, teak-wood, on marl, Blokhuis s.n., May 1918 (B); Pajaman, teak-wood, Beumée 880, June 1917 (B); Padangan, teak-wood, 100 m, Beumée 1006, Aug. 1917 (B); between Randoeblatoeng and Blora, 50 m, teak-wood, Blokhuis s.n., May 1919 (B); Soerakarta, Klaten, 180 m, Leefmans 135 (B); Madioen, Madioen, 60 m, Wisse 44, May 1919 (B); Ngawi, 150 m, Stoutjesdijk 14, June 1921 (B); id., 50 m, Soeradji 11, May 1918 (B); Soerabaja, Soerabaja, Dorgelo 739, July 1922 (Pa); Wonokromo, 5 m, in thickets, van Slooten 2062, Sept. 1928 (B); S. Soerabaja, Pakis, teak-wood on black volcanic soil, 50—100 m, Beumée 2494, May 1918 (B); limestone hill near Gasari, northwest of Sidajoe, 50—100 m, Dorgelo 2129, Sept. 1923 (B); Malang, Pasoeroean, BACKER 37034, May 1930 (Pa); Soemberwalo, 500 m, BACKER 3515, May 1912 (B); Bantoer, 300 m, BACKER 3855 (B); between Jasawilangoen and Tempoeran, 20 m, on hedges, BACKER 8018, May 1913 (B, L); Bangil, thickets, 5 m, BACKER 7595, May 1913 (B); Kepoeh, in bushes, 75 m, BACKER 24215, June 1918 (B); Peteng, teak-wood, on red volcanic soil, BEUMÉE 2705, June 1918 (B); Kidoel, BUYSMAN 174, Aug. 1907 (U); Alkmaar near Lawang, MOUSSET 786 (B); Malang, c. 450 m, WISSE 220, June 1920 (B); G. Bentar near Probolinggo, 30 m, thickets on dry hill, BACKER 24320, June 1918 (B); Besoeki, N. slope of G. Idjen above Bajeman, thickets, 500 m, BACKER 24888, June 1918 (B); Sitoebondo, thickets, 30 m, BACKER 24628, June 1918 (B); Soemberwaroe, 50—150 m, KOORDERS 43882 β (see remarks), Aug. 1916 (B, L); Soemberwaroe, Kali Kelorkoran, CLASON C 100, May 1931 (B); Glenmore, RANT 1004, May 1933 (B); near Poeger, KOORDERS 21085 β, Oct. 1895 (B); id., KOORDERS 21463 β (B); Madoera, Kangean-islands, Kangean, Tambajangan, 110 m, BEGUIN L 2 (see remarks), May 1919 (B); id., Paliat, on hedge, BACKER 29629 (see remarks), May 1919 (B); id., Sepandjang, thickets, BACKER 29028, Apr. 1919 (B); id., Sepapan, thickets, BACKER 28545 (see remarks), Apr. 1919 (B).

CELEBES, without precise locality, MEYER s.n. (BD); Celebes and Dependencies, Roembia, Liano, 25—150 m, ELBERT 3012, Sept. 1909 (L); Salajar islands, Salajar, TEYSMANN 13885, see remarks (B); id., Kajoeadi, c. 100 m, DOCTERS VAN LEEUWEN 1330, May 1913 (U); id., Bonerate, c. 40 m, in thickets, DOCTERS VAN LEEUWEN 1435, May 1913 (B, U); P. Moena, Raha, in dry vegetation, ELBERT 2888, July 1909 (L); id., id., on dry soil, ELBERT 2931, Aug. 1909 (L); P. Boeton, Baoe-baoe, in thickets, on very dry soil, ELBERT 2653, Sept. 1909 (L).

BALI, G. Goendoel, v. D. PAARDT 47, June 1926 (B); Noesa Penida, between Sampelan and Tanglad, way along coast, DE VOOGD 2396, April 1936 (B); id., between Tanglad and Keloempoeh, common, 400—500 m, DE VOOGD 2438, April 1936 (B).

LOMBOK, Ekas (?), thickets, Mrs. RENSCH 391, Apr. 1927 (B); Rindjani, northern slope, Bajan, on sand, 125—225 m, ELBERT 683, Apr. 1909 (L); Rindjani, northern slope, Sadjang, 500—700 m, ELBERT 795, Apr. 1909 (L).

SOEMBAWA, Dompoe, in dry thickets, Mrs. RENSCH 843, May 1927 (B); E. Soembawa, Kapenta, teak-wood, 200 m, DE VOOGD 2560, June 1936 (B).

SOEMBA, Maoemaroe, forest, IBOET 485, May 1925 (B, L).

TIMOR, without precise locality, TEYSMANN s.n. (B); a duplicate specimen from the Paris herbarium, without collector's name (BD, L); a specimen from Koepang, cultivated in the Botanic Garden at Buitenzorg, B. X. 1. R. (B); Koepang, near Babaoe, ZEIJE s.n., May 1875 (BD); north coast of bay of Koepang, Taimanam, clearing in mountain forest, 1400 ft., NAUMANN s.n., May 1875 (BD, named var. *inaequalis* ENGL.); South Middle Timor, Soë, 880 m, WALSH 117, Jan. 1929 (B); id., Kolbano, WALSH 376, Apr. 1929 (B).

MOLUCCAS, Timorlaoet (according to HEMSLEY, 1884).

NEW GUINEA, Territory of New Guinea, Constantinhafen, SCHLECHTER 14236, March 1902 (B, BD, K, P).

BISMARCK ARCHIPELAGO, New Ireland, Nusa, WARBURG 21262 (BD); id., Namatanai, Nukonuko, alang-field, PEEKEL 362, March 1910 (BD).

PHILIPPINE ISLANDS, according to MERRILL on Luzon (Ilocos Norte, Lepanto, Bontoc, Union, Bulacan, Rizal, Laguna, Batangas), Culion, Palawan, Mindanao (Zamboanga) and Basilan, in thickets at low and medium altitudes. Without precise locality, CUMING 829 (L); Luzon, CUMING 645 (BD); Prov. of Rizal, Montalban, LOHER 7281, Oct. 1903 (B, BD, K); Manila, Rev. Pl. Vasc. Filip. 476 (L); id., Antipolo, RAMOS, Bur. of Sc. 1600, Jan. 1914 (B, BD, L, P); Batangas Prov., Punta Santiago, MERRILL, Spec. Blancoanae 822, Febr. 1915 (B, BD, K, L); Zambales Prov., Anuling, RAMOS and EDAÑO, Bur. of Sc. 44603, Nov.-Dec. 1924 (S); Culion, MERRILL 540, Dec. 1902 (BD, K); Palawan, Puerto Princesa, Mt. Pulgar, ELMER 12878, March 1911 (B, L).

CHRISTMAS ISLAND, Flying fish cove toward South Point, RIDLEY 26, Oct. 1904 (S).

Distribution: Tropical East Africa, Madagascar and adjacent islands, India (Central Provinces and Bombay to S. India, Assam, Indo-China [1]), Ceylon, Malaysia, N. Caledonia, Tropical Australia.

Vernacular names: aroj djotang lemboet (Sund., KOORDERS), aroj djetton lemboet (Sund., MIQUEL), aroj jutton lumboet (HASSKARL), aroj pondolandak (Bantam, HASSKARL), aroj kapiratoe (Priangan, BOERLAGE), kapiratoe (Jav., Pekalongan, Djember, KOORDERS), rawatan (Jav., Semarang, KOORDERS), lawatan (Jav., Semarang, KOORDERS), oyot kitsjil (BURMAN), siemboekan (Mad., Bali, V. D. PAARDT), hímag (Philipp., Panay Bisáya language, MERRILL).

Remarks. 1. The pubescence of this species differs to a great extent in various specimens. In many specimens the indument in the inflorescences is denser than in the other parts. As has been mentioned already in the description, the length of the peduncle is very variable, from only a few mm to several cm. The sepals are slightly unequal in length, the three outer ones, of which the third one is often oblique at the base, are ovate-lanceolate to ovate, acuminate at the apex, attenuate to the base. Some specimens have the sepals broader than is commonly found; they closely resemble *J. Zollingeri.* Such specimens I saw from East Java (Besoeki, KOORDERS 43882 β) and from the Kangean Islands (BACKER 29629, 28545, BEGUIN L 2). See also the remarks under *J. Zollingeri.*

2. A remarkable number is that collected by TEYSMANN (13885) on the island of Salajar (Celebes and Dependencies), showing an erect habit, according to the annotation on the label: "Convolvulacea erecta". It is in fruiting stage; flowers and leaves are lacking; the younger branches seem to have been densely tomentose. It might represent a

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[1]) A specimen collected in Tonkin, Indo-China, has the flowers larger, the corolla is about 15 mm long and 20 mm broad.

Var. **grandiflora** VAN OOSTSTR., nov. var., differt corolla circ. 15 mm longa, limbo circ. 20 mm lato.

INDO-CHINA, Tonkin, vicinity of Tu-Phap, BALANSA 3539, Nov. 1888 (L, *type*).

distinct variety, as has been supposed already by HALLIER, who added the following identification: *Jacquemontia paniculata* HALL. f. var., but as the material is so insufficient it seems better not to give a definite opinion until better specimens are available.

var. **multivalvis** (R. BR.) VAN OOSTSTR., nov. comb. — *Convolvulus multivalvis* R. BR., Fl. Nov. Holl. ed. 1 (1810) p. 483, var. α; BENTH., Fl. Austr. IV (1869) p. 429; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1070; id., Compr. Cat. Queensl. Pl. (1909) p. 353, fig. 328 — *Convolvulus parviflorus* VAHL var. *tomentosa* WARB. in ENGL., Bot. Jahrb. XVIII (1894) p. 207; SCHUM.-LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 518 — *Jacquemontia multivalvis* (R. BR.) HALL. f. in Jahrb. Hamb. Wiss. Anst. XV (1898) p. 42; SCHUM.-LAUTERB., Fl. Deutsch. Schutzgeb., Nachtr. (1905) p. 369, with exception of the specimen SCHLECHTER 14236, which belongs to typical *J. paniculata* (BURM. f.) HALL. f.

Plant covered with a dense, yellowish brown tomentum, finally glabrescent.

TIMOR, without precise locality, ZIPPELIUS (L, labelled *Convolvulus sidaefolius* ZIPP., an unpublished name).

NEW GUINEA, Territory of New Guinea, Kelana, in fissures of rocks, prostrate, HELLWIG 48, fl. July 1888 (BD, *type* of *Convolvulus parviflorus* VAHL var. *tomentosa* WARB.); Papua, Port Moresby, GOLDIE (according to v. MUELLER); id., sea shore, CARR 11827, fl. April 1935 (L).

PHILIPPINE ISLANDS, Apo Island, Mindoro Straits, MERRILL 420, Dec. 1902 (BD).

Distribution: Moluccas, Philippine Islands, New Guinea, Australia (N. Australia, Queensland).

Remarks. The specimens from Timor, collected by ZIPPELIUS perhaps differ by the glabrous sepals (only seen in fruiting state).

var. **philippinensis** VAN OOSTSTR., nov. var.

Differt sepalis 3 exterioribus ellipticis vel elliptico-oblongis, obtusiusculis, cuspidatis vel mucronulatis, non distincte acuminatis, herbaceis, 2 interioribus paullo latioribus, margine scariosis; pedunculis filiformibus, tenuioribus.

PHILIPPINE ISLANDS, Luzon, prov. of Ilocos Norte, Burgos, RAMOS, Bur. of Sc. 27181, Febr.-March 1917 (B, *type*); prov. of Ilocos Sur, Candon, CLEMENS 18677, Nov. 1928 (B); prov. of Union, Bauang, ELMER 5733 (see remarks), Febr. 1904, (B, BD, K, L).

Distribution: Philippine Islands (Luzon).

Remarks. 1. The pubescence of this new variety rather varies in the three numbers mentioned. Whereas CLEMENS 18677 is nearly glabrous, the two other numbers are covered with a very short tomentum. This tomentum is well-developed in the young parts, afterwards it apparently disappears.

2. The specimens ELMER 5733 are not quite typical var. *philippinensis*; their peduncles are partly somewhat thicker.

2. Jacquemontia Zollingeri (CHOISY) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 543 — *Convolvulus Zollingeri* CHOISY in ZOLL., Syst. Verz., 2. Heft (1854) p. 130, 132; MIQ., Fl. Ned. Ind. II (1857) p. 622; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509.

Herbaceous twiner, lignescent in the basal parts, pubescent to short-tomentose. Stems terete, glabrescent, brownish. Leaves rather shortly petiolate, blade ovate, acute or short-acuminate, base cordate, to 5.5 cm long and to 3.5 cm broad, but often smaller, pubescent to short-tomentose; lateral nerves 7—8. Peduncles axillary, rather short, 2—15 mm, pubescent to short-tomentose, cymosely branched, few- to several-flowered; bracts subulate, the lower to 5 mm long, the upper much shorter. Sepals very unequal, the two exterior ones broad-ovate, acute to short-acuminate at the apex, cordate or rounded at the base, herbaceous, pubescent to tomentose, the third semi-ovate, acute, partly herbaceous, partly scarious, the fourth and fifth lanceolate, acute, hairy near the apex, for the rest glabrous; two exterior ones 7 mm, third 6.5 mm, fourth and fifth 4.5 mm long. Corolla pale lilac, funnel-shaped, slightly 5-lobed, glabrous, 9—11 mm long. Filaments inserted 1.5 mm above the corolla base, pubescent at the place of insertion. Style glabrous, filiform, with 2 filiform stigmas. Capsule globular, 8-valved. Seeds 4, black, minutely verrucose, glabrous, about 2 mm long, the angles with a very narrow scarious wing.

BALI, Saraja, ZOLLINGER 705, May 1845 (B, L, U).

SOEMBAWA, Bima, between Sapi and Wira, in thickets near the coast, ZOLLINGER 3422 Z. M., Oct. 1847, *type* (B, L).

TIMOR, without precise locality, DE CASTRO s.n. (B); id., only numbered 14 (B).

Distribution: Lesser Sunda Islands.

Remarks. This species seems to be very closely related to the preceding one; perhaps it would even be better to consider it merely as a variety of it. In this connection may be pointed to some specimens mentioned under *J. paniculata* from East Java and from the Kangean islands (see remarks under *J. paniculata*). *J. paniculata* and *J. Zollingeri* show a great resemblance in general habit as well as in the form and size of the leaves and the inflorescences. The main differences may be found in the form of the sepals, the two outer ones of which in *J. Zollingeri* are broad-ovate, acute to acuminate at the apex and cordate or rounded at the base. The specimens have the same short and dense tomentum as var. *multivalvis* of *Jacquemontia* *paniculata.* It is an interesting fact that besides these tomentose specimens there is also a much less pubescent form in which the stem and leaves are only sparsely pilose and glabrescent, whereas the inflorescences still bear the dense tomentum:

var. **Jonkeri** VAN OOSTSTR., nov. var.

Differt ramis, petiolis, foliisque sparse pilosis vel glabrescentibus, pedunculis, pedicellis, calycibusque dense tomentosis.

TIMOR, without precise locality, JONKER 285, fl. Apr. (U, *type*).

Distribution: Timor.

A remarkable plant with its sparsely pilose stems and leaves and its densely tomentose inflorescences with very short peduncles (2—5 mm) and white flowers.

3. **Jacquemontia tomentella** (MIQ.) HALL. f. in Versl. 's Lands Plantent. 1895 (1896) p. 126; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 499, 508; HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 377; RENDLE in Journ. Linn. Soc. XLII (1914) p. 113; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508 — *Lettsomia tomentella* MIQ., Fl. Ned. Ind. Suppl. (1860) p. 560.

A large, woody twiner. Stems terete, angular upwards, the younger parts densely puberulent with very minute stellate (7—13 rays) hairs of a pale yellow-brown colour, making the impression of being farinose; the adult parts glabrescent, fistulose, 4—5 mm in diam. Leaves petiolate, the petiole much shorter than the blade, 2—4.5 cm long, densely puberulent like stems, longitudinally grooved; the blade large, ovate, acuminate at the apex, rounded or slightly cordate at the base, 6—14 cm long and 4—9.5 cm broad, with the same farinose stellate pubescence as the stems, the lower surface paler than the upper one, the upper surface glabrescent; nervation prominent beneath, lateral nerves 6—7, secondary nerves parallel. Peduncles axillary, farinose with stellate hairs like the stems, shorter or longer than the leaves, corymbosely branched above, the flowers in dense umbel-like inflorescences, forming large, more or less unilateral panicles at the end of the branches; pedicels 3—6 mm, lower bracts sometimes foliaceous, upper ones much smaller. Sepals almost equal in length, 5—6 mm, the two outer ones ovate, obtuse, the three inner ones broad-ovate to orbicular, concave, all puberulent outside and with minute pellucid dots, inside glabrous. Corolla pink or white, funnel-shaped, with 5 densely pilose midpetaline areas, 14—15 mm long or more. Filaments with dilated, pilose base. Ovary pilose, 2-celled, each cell with 2 ovules, style filiform, pilose near the base, stigma lobes thick, almost globular, wrinkled. Capsule not seen (for the capsule see under var. *micrantha*).

SUMATRA, West Coast, Mocara Sipongi, TEYSMANN 1149 HB (B; U, *type of Lettsomia tomentella* MIQ.); Boudjol, TEYSMANN 1151 HB (B, L, U); Djambi, Pahoe, on hill, c. 30 m, POSTHUMUS 1017, Oct. 1925 (B, L).

BORNEO, without precise locality, DE VRIESE 213, 1859—60 (L).

Distribution: Sumatra, Borneo.

Vernacular names: akar koemiet (Sumatra, TEYSMANN), lehoe-lehoe (Sumatra, POSTHUMUS).

Remarks. All parts of the plant are covered with a dense farinose pubescence consisting of very small scalelike stellate hairs, with 7—13 short rays. These scales give a typical pale yellowish brown colour to the specimens.

var. **micrantha** HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 377; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508; VAN OOSTSTR. in Kew Bull. (1938) p. 175.

Indument as in the type. Flowers smaller than in the typical specimens of the species, sepals of the same form, but shorter, 3—4 mm long, corolla 8—10 mm long, capsule ovoid, mucronate, about 8 mm high, brown, 2-celled, 4-valved, valves hairy at the top, lanceolate, acute, seeds 4 or often less, brownish black, glabrous.

BORNEO, W. division, Sintang, G. Kelam, HALLIER 2256, Jan. 1894 (B, BD, K, L); Sintang, upper Mandai River, Nanga Raoen, HALLIER 2570, March 1894 (B, L); S. and E. division, between Salinahu and Simpokak, WINKLER 2982, July 1908 (B). Cultivated in the Botanic Garden at Buitenzorg sub n. XV. H. 29 and XV. H. 32 (B); Sarawak, Sarawak river, Perkulu Ampat, Jeramé, HAVILAND b. p. r. c., June 1890 (K, *type*; S); Saribas, Paku, HAVILAND and HOSE 3519, Dec. 1893 (K, L); Baram district, Miri river, HOSE 525, Jan. 1895 (K); near Long Kapa, Mount Dulit, Ulu Tinjar, under 300 m, in secondary forest, RICHARDS 1257, Aug. 1932 (K); Kabayan-Koung, 600—1300 ft., HOLTTUM, Singapore Field n. 25110; Nov. 1931 (S); British North Borneo, Tenom., 700 ft., abundant everywhere; it forms dense masses over exposed low undergrowth, which are simply smothered in delicate rose-pink flowers that contrast charmingly with the silvery green leaves, GIBBS 2717, fl. January (K); Mount Kinabalu, between Kibayo and Keung, CLEMENS 9848, Oct. 1915 (B).

Distribution: Borneo.

Vernacular names: ampur (Sintang, HALLIER), djela-ang (S. and E. division, WINKLER).

Remarks. A large liane, 9—12 m high (RICHARDS), the flowers are purple-pink (HOLTTUM), pale magenta (RICHARDS), red-purple (HAVILAND), pink or white (HALLIER); anthers and stigmas are white; the leaves and the stem are whitish-green (RICHARDS); silvery green (GIBBS). See also the remarks by HALLIER l.c. p. 377—378.

var. **heteroradiata** VAN OOSTSTR., nov. var.

Var. micranthae simillima, differt pilis stellatis biformibus, pluribus ut in var. micrantha, ceteris 8—10-radiatis, radio uno quam ceteris multo longiore, erecto.

BORNEO, S. and E. division, Darat Mahakam, exped. NIEUWENHUIS, AMDJAH 33, Oct. 1898 (B; L, *type*); Soengei Bloe-oe, exped. NIEUWENHUIS, JAHERI 406, 1896—97 (B, L).

Distribution: Borneo.

Remarks. This new variety much resembles var. *micrantha,* differs, however, by the curious stellate hairs, being of two forms, viz. partly as in var. micrantha and partly with several short rays and a longer erect one, much exceeding the others.

var. **tomentosa** VAN OOSTSTR., nov. var.

Var. micranthae simillima, differt pilis stellatis 3—4(—5)-radiatis, radiis longioribus.

BORNEO, Sarawak, without precise locality, BECCARI 2761 (K); Sarawak river, Perkulu ampat, HAVILAND b. q. n. x, June 1890 (K); Limbang, HAVILAND b. q. m. x. b., 113, in black and 590, in red (K); Limbang, HOSE 764, Dec. 1895 (K, *type*); Trusan River, HAVILAND b. c. b. n., 832 (K).

Distribution: Borneo.

Remarks. Stellate hairs with 3—4, occasionally with 5 rays; rays longer than in var. *micrantha,* hairs often differing in size, often larger mixed with smaller ones. The indument on the lower surface of the leaves is often much denser than on the upper surface; sometimes the upper surface is almost glabrous.

Cultivated for the flowers are:

4. J. pentantha (JACQ.) DON. A glabrous or sparsely hairy twiner. Leaves ovate to broad-ovate, acuminate; peduncles long and slender. Flowers in a few to many-flowered umbelliform cyme; bracts much longer than in *J. paniculata,* linear, the lowers ones to 10 mm long; two outer sepals 7—10 mm long, ovate, long acuminate, third sepal oblique, semi-ovate, 2 interior sepals much shorter, ovate to lanceolate, acuminate. Corolla blue, white at the base, larger than in *J. paniculata,* 1—1.5 cm long, the limb about 2 cm broad.

MALAY PENINSULA, Singapore, cultivated in the Botanic Gardens, FURTADO s.n.; MD. NUR s.n.; HULLETT 356 (S).

JAVA, Malang, Malang, cultivated, ULTÉE s.n. (B).

5. J. Blanchetii MORIC. A glabrous or sparsely hairy twiner. Leaves ovate or ovate-oblong, acuminate; peduncles long and slender. Flowers in few-flowered umbelliform cymes; bracts minute; sepals glabrous, two outer sepals shorter than the inner ones, ovate to elliptic, obtuse, 4—6 mm long, the 3 inner ones more oblong, obtuse, 7—7.5 mm long. Corolla about 2.5 cm long, pale blue or violet, the midpetaline areas paler outside.

Java, Buitenzorg, Buitenzorg, cultivated in the Botanic Garden n. X. F. 63 (L); XV. H. 42 (B); XV. K. B. XII. 3 (B); XV. K. B. XII. 9 (B); Hallier C. 14, March 1893 (L); Kedoe, Wonosobo, cultivated, Brinkman 643, July 1935 (B); Malang, Pasoeroean, cultivated, Backer 36032, July 1929 (Pa).

IX. ANISEIA Choisy

Choisy in Mém. Soc. Phys. Genève VI (1833) p. 481; VIII (1838) p. 65; id. in DC., Prodr. IX (1845) p. 429; Miq., Fl. Ned. Ind. II (1857) p. 623; Peter in Engl.-Prantl, Nat. Pfl. fam. IV, 3a (1891) p. 25; Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 579; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 499, 509; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 88; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 301; Ridley, Fl. Malay Penins. II (1923) p. 456; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 359; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 514 — *Ipomoea,* subgenus *Aniseia* Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 200; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 104 — *Ipomoea* § *Aniseia* Gagnep. et Courch. in Lec., Fl. Indo-Chine IV (1915) p. 231.

Prostrate or twining herbs. Leaves linear, lanceolate, ovate or elliptic, often mucronate. Flowers on axillary peduncles, solitary or in few-flowered dichasial inflorescences. Sepals 5, herbaceous, acute or acuminate, unequal, the 3 exterior ones much larger, often decurrent on the pedicel, enlarged in fruit. Corolla broad-tubular to funnel-shaped, 5-toothed or almost entire, with 5 well-limited midpetaline hairy bands outside. Stamens and style included. Pollen smooth. Ovary glabrous, 2-celled, each cell with 2 ovules. Style 1, slender, stigmas thick, globular or oblong. Disk small or absent. Capsule globose, glabrous, 2-celled, 4-valved, 4- or less-seeded. Seeds trigonous or globose, black.

Distribution: Species all confined to tropical and subtropical America with the exception of one, which occurs in the tropics of the New and the Old World.

One species in Malaysia:

Aniseia martinicensis (Jacq.) Choisy in Mém. Soc. Phys. Genève VIII (1838) p. 66; id. in DC., Prodr. IX (1845) p. 430; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 96; id. in Bull. Herb. Boiss. V (1897) p. 382; Koorders in Meded. 's Lands Plantent. XIX (1898) p. 542 [*A. martiniensis* (Choisy) Hall. f.]; Boerl., Handl. Fl. Ned.

Ind. II (1899) p. 499, 509; HALL. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 674; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 301; MERRILL and ROLFE in Philipp. Journ. Sc. III (1908) p. 123; KOORDERS, Exk. fl. Java III (1912) p. 111; KOORD.-SCHUM., Syst. Verz. III (1914) p. 109; BOLD., Zakfl. Java (1916) n. 796; HALL. f. in Meded. Rijksherb. Leiden 35 (1918) p. 5; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508; RIDLEY, Fl. Mal. Penins. II (1923) p. 456; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 359; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 514 — *Convolvulus martinicensis* JACQ., Select. Stirp. Amer. (1763) p. 26, t. XVII — *C. uniflorus* BURM., Fl. Ind. (1768) p. 47, t. 21, fig. 2; DESR. in LAM., Encycl. III (1789) p. 544 — ? *C. emarginatus* VAHL, Symb. III (1794) p. 23 (I did not see the specimen of KÖNIG mentioned by VAHL); WILLD., Sp. Pl. I (1797) p. 847; Pers. Syn. Plant. I (1805) p. 177 — *Ipomoea martinicensis* (JACQ.) MEY., Prim. Fl. Esseq. (1818) p. 98 — *I. uniflora* (BURM.) R. et S., Syst. Veg. IV (1819) p. 247; BLUME, Bijdr. (1825) p. 721 (*I. uniflora* BURM.); BENTH., Fl. Austr. IV (1869) p. 425, excl. syn. *A. ensifolia, cernua*; F. VILL., Novis App. (1880) p. 140 (not seen); CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 201; TRIMEN, Handb. Fl. Ceylon III (1895) p. 215; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1065, excl. syn. *A. ensifolia, cernua*; id., Compr. Cat. Queensl. Pl. (1909) p. 349; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 244 and p. 236, fig. 29 (5) — *Convolvulus Rheedii* WALL. in ROXB., Fl. Ind. (1824) p. 70; WIGHT, Ill. Ind. Bot. (1831) p. 19, t. 8; WIGHT in HOOK., Bot. Misc. II (1831) p. 106, t. 8 — *Convolvulus pterocarpus* BERT. ex COLLA, Hort. Ripul. (1824) p. 37 (not seen) — *Aniseia uniflora* (BURM.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 483, t. 2, fig. 9; id. in DC., Prodr. IX (1845) p. 431; WIGHT, Icon. III (1843—47) t. 850; MIQ., Fl. Ned. Ind. II (1857) p. 623; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 25, fig. 12A; COOKE, Fl. Bombay II (1905) p. 231; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 88; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 122; GAMBLE, Fl. Pres. Madras V (1923) p. 924 — *Ipomoea pterocarpa* (BERT.) DON, Gen. Syst. IV (1838) p. 282 — ? *I. lanceolata* DON, l.c.; CHOISY in DC., Prodr. IX (1845) p. 390 — *Aniseia emarginata* (VAHL) HASSK., Cat. Hort. Bogor. (1844) p. 139; id., Pl. Jav. Rar. (1848) p. 518; MIQ., Fl. Ned. Ind. II (1857) p. 624 — *Calystegia mucronata* SPR. ex CHOISY in DC., Prodr. IX (1845) p. 430, pro synon.

Herbaceous. Stems prostrate or twining, rooting in the basal parts (always?), to 1.50 m long, terete, finely striate or smooth, appressed pilose or glabrous. Leaves narrow- to broad-oblong, obtuse, truncate, emarginate or rarely acute at the apex, mucronulate, attenuate towards the base, 3.5—7 cm long, 0.8—3 cm broad, glabrous or sparsely pilose above, sparsely pilose beneath, sometimes glabrous on both sides; petiole much shorter than the blade, 0.5—2 cm. Inflorescences axillary, 1-, sometimes 2- or 3-flowered; peduncle shorter than the leaf, 2—5 cm, more or less densely pilose, upwards often denser; pedicel shorter than the outer sepals, 5—7 mm or longer, appressed pilose with short, soft hairs; bracts small, narrow-lanceolate to subulate, sharply acute. Sepals herbaceous, reticulately nerved, the 3 outer ones much larger than the 2 inner, sparsely pilose outside, 12—20 mm long, the two outermost ones ovate, acute, mucronulate at the apex, rounded, slightly cordate or acute at the base and short-decurrent on the pedicel; third sepal lanceolate, more or less falcate, short-decurrent on the pedicel; 2 interior sepals ovate to lanceolate, acute or acuminate, 10—13 mm long, not decurrent; outer sepals enlarged in fruit, and then scarious, reticulately nerved, 2—2.5 cm long. Corolla white, funnel-shaped, 2—3 cm long; limb slightly 5-lobed; midpetaline areas hairy, with a hairy mucro, the connecting fields glabrous. Stamens included, filaments decurrent on the corolla, hairy at the base. Disk obsolete. Ovary glabrous, style filiform, stigmas 2, small, thick, globular to oblong. Capsule ovoid, 2-celled, 4-valved, 4- or less-seeded; valves acute, oblong, brown outside, silvery white and lustrous inside. Seeds dull black, woolly at the angles, minutely pilose on the sides, 5—6 mm in diam.

MALAY PENINSULA, Perak, Kuala Dipong, SCORTECHINI 1780 (S); Kota Bahru, KING's coll. 1075 (according to PRAIN); Dindings, Batu Hampar, BURKILL, Singapore Field n. 507, March 1914 (S); Kelantan, Kamposa, RIDLEY s.n., Aug. 1889 (S); Selangor, VESTERDAL 41, Nov.-Dec. 1935 (S); Pahang, Pekan, RIDLEY s.n. (S); Pekan, Katapang, RIDLEY 1248, May 1890 (S); Malacca, GRIFFITH, MAINGAY (according to CLARKE and PRAIN); JAGOR 268 (BD).

SUMATRA, without precise locality, KORTHALS s.n. (L); KORTHALS 87 (B, L); KORTHALS 252 (L); East Coast, near Serdang, rather rare, LÖRZING 3255, Oct. 1914 (B); between Serdang and Rantau pandjang, not rare, LÖRZING 3374, Nov. 1914 (B); Djambi, Pahoe, edge of forest, POSTHUMUS 1047, Oct. 1925 (B, L); Palembang, Kajoeagoeng, DE VOOGD 74, Febr. 1928 (B).

JAVA, according to BACKER in the lower parts of the island, in marshy grass-fields, along water, along sawahs, rather frequent in some localities, but in general rare. Bantam, Tjaringin, edge of pool, BACKER 7348, March 1913 (B); Batavia, "in fruticetis uliginosis circa Bataviam", BLUME s.n. (B, L); id., BLUME 1113 (L); Meester Cornelis, in wet grassy places, BACKER 33864, May 1903 (B, L); Kali Soenter, in wet grassy places, BACKER 33840 (B); Kampong Goesti, wet grassy places, BACKER 33841, June 1904 (B); Buitenzorg, Tjibinong, on dike of pool, VAN STEENIS 3088, Sept. 1929 (B); cult. in Botanic Garden, II. Q. E. 9 (B); Cheribon, between Haoergeulis and Tjipoenegara, BACKER 16831, Oct. 1914 (B); Malang, Djatirata, railroad in marshy forest, many specimens, BACKER 7831, May 1913 (B); S.-Djatirata, along ditch, many specimens, BACKER 8134, May 1913 (B).

BORNEO, without precise locality, KORTHALS 85 (L); W. division, Kapoeas, near Soekalanting and Semitau, HALLIER 84, Borneo-expedition 1893—94 (B); S. and E. division, Bandjermasin, KORTHALS 252 (L); West-Koetai, near Moeara Kaman, dried up padang, common, ENDERT 1483, June 1925 (B); West-Koetai, near Lakoem, secondary forest, along brook, ENDERT 1749, June 1925 (B).

CELEBES, Celebes and Dependencies, Pangkadjene, on rocks, TEYSMANN 12106 (B); Wavotobi Do., marshy forest, KJELLBERG 867, March 1929 (B); Manado, near Manado, sandy beach in thin, low forest, rather rare, KOORDERS 16558 β, Dec. 1894 (B, BD, L).

NEW GUINEA, Dutch New Guinea, New Guinea expedition 1904—1905, near Etnabay, KOCH s.n. (L); Merauke, in alangfield, VERSTEEG 1949, Nov. 1907 (B); Mamberamo, FEUILLETAU DE BRUYN 136, Oct. 1914 (B); mouth of Mamberamo, JANOWSKY 424, Sept. 1913 (B); Pionierbivak, c. 50 m, clearings, among ferns, DOCTERS VAN LEEUWEN 9352, June 1926 (B); Papua, Lake Daviumbu, Middle Fly River, swamp margins, BRASS 7651, Sept. 1936 (L).

PHILIPPINE ISLANDS, without precise locality, VIDAL 3356 (according to MERRILL, 1923); according to MERRILL among grasses in freshwater swamps at low altitudes; very rare or local in the Philippines; Palawan, Lake Manguao, MERRILL 9458, Apr. 1913 (B, K, L, P).

Distribution: Tropics of the Old and the New World.

Vernacular names: akar ulan putih (Malay Peninsula, RIDLEY), akar lidah patong (Malay Peninsula, JAGOR, RIDLEY), bagioe seroet (Djambi, POSTHUMUS), karoet (Palembang, DE VOOGD), hat bijawak (Borneo, W.-Koetai, ENDERT); m(w)anaring-i-lawanan, wanaring pante (Manado, KOORDERS).

Use: as a vegetable (Malay Peninsula, RIDLEY; Borneo, BOERLAGE).

X. CONVOLVULUS L.

L., Spec. Pl. ed. 1 (1753) p. 153; BLUME, Bijdr. (1825) p. 724; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 477; id. in DC., Prodr. IX (1845) p. 399; MIQ., Fl. Ned. Ind. II (1857) p. 621; BENTH., Fl. Austr. IV (1869) p. 428; BENTH. et HOOK., Gen. Plant. II (1876) p. 874; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 217; BAILL., Hist. Pl. X (1891) p. 321; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 33; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 579; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 226; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 501, 509; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 88; KOORDERS, Exk. fl. Java III (1912) p. 111; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 300 —

Stevogtia Neck., Elem. II (1790) p. 23 — *Rhodorrhiza* Webb in Bot. Reg. (1841) Misc. p. 69 — *Pantocsekia* Griseb. in Oesterr. Bot. Zeitschr. XXIII (1873) p. 267.

Annual or perennial herbs, undershrubs or shrubs with prostrate, erect or climbing stems. Hairs simple or rarely with 2 arms. Leaves entire, or rarely more or less deeply lobed, mostly spathulate, attenuate to the petiole or hastate. Flowers regular, axillary, solitary, in few-flowered cymes or in dense involucrate heads. Sepals 5, equal or subequal, obtuse or acute. Corolla various in length, funnel-shaped, white, pink, blue or yellow, with 5 often not well-defined midpetaline areas. Stamens and style included; filaments often unequal, filiform, pollen smooth, ellipsoid; disk annular or cup-shaped; ovary 2-celled, each cell with 2 ovules; style simple, filiform, stigmas 2, linear or filiform. Capsule 2-celled, usually 4-valved, 4- or less-seeded; seeds black or brown, mostly glabrous.

Distribution: In the temperate and subtropical regions of both hemispheres, rarer in the tropics.

One species in Malaysia:

Convolvulus arvensis L., Spec. Pl. ed. 1 (1753) p. 153; Choisy in Mém. Soc. Phys. Genève VI (1833) p. 479; id. in DC., Prodr. IX (1845) p. 406; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 219; Watt, Dict. Econ. Prod. Ind. II (1889) p. 518; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 108; Baker and Wright in This.-Dyer, Fl. Cap. IV, 2 (1904) p. 75; Cooke, Fl. Bombay II (1905) p. 234; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 97; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 106; Gamble, Fl. Pres. Madras V (1923) p. 925 — *C. Malcolmi* Roxb., Fl. Ind. I (1832) p. 474.

Perennial. Stems prostrate or twining, angular, sparsely pubescent or glabrous. Leaves petiolate, the petiole shorter than the blade; blade entire, ovate-oblong, oblong or lanceolate, mostly obtuse and mucronulate at the apex, hastate or sagittate at the base, to 4—5 cm long, often more or less secund. Flowers in axillary, 1- or sometimes 2—3—more-flowered cymes; peduncles angular, shorter or longer than the leaves; bracts linear, about 3 mm long; pedicels much longer than the calyx. Sepals slightly unequal, the 2 exterior ones a little shorter, oblong-elliptic, obtuse, shortly ciliate, the interior ones broader, almost orbicular, obtuse or slightly retuse, more or less distinctly mucronulate, 3.5—5 mm long. Corolla white or pink or white with pink or red midpetaline areas outside or pink with red or white midpetaline areas outside, broadly funnel-shaped, about 2 cm long, the limb shallowly lobed. Stamens slightly unequal, the filaments with broadened base, papillose at the margin. Ovary glabrous, style filiform, stigmas filiform. Capsule ovoid-globose, glabrous, 5—8 mm long, 2-celled, 4-valved, 4-seeded. Seeds dark brown or black, 3—4 mm long.

JAVA, Malang, Semeroe-complex, saddle G. Tengger-Ajah ajah djambanga, 2100 m, on uncultivated fields, frequent, GISIUS 70, Sept. 1927 (Pa); according to an annotation on the label, by BACKER, in 1930 in the garden of the Semeroe farm.

Distribution: Widely spread in the temperate and subtropical parts of both hemispheres, rarely in the tropics.

Vernacular names: small bindweed, akkerwinde (Dutch).

Convolvulus sphaerostigma CAV., Icon. V (1799) p. 54, t. 481 (= *Jacquemontia hirsuta* CHOISY) has been recorded from Mindanao and from Mexico. According to MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 359 the Mindanao record was based either on an erroneously localized specimen (Malaspina Expedition) or on an erroneously identified one.

XI. CALYSTEGIA R. BR.

R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 483, nom. generic. conserv.; CHOISY in Mém. Soc. Phys. Genève VIII (1837) p. 485; id. in DC., Prodr. IX (1845) p. 433; MIQ., Fl. Ned. Ind. II (1857) p. 624; BENTH. et HOOK., Gen. Plant. II (1876) p. 874; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 217; BAILL., Hist. Pl. X (1891) p. 324; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 36; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 580; BOERL., Handl., Fl. Ned. Ind. II (1899) p. 500, 509; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 299; KOORDERS, Exk. fl. Java III (1912) p. 111; RIDLEY, Fl. Malay Penins. II (1923) p. 454 — *Volvulus* MEDIC. in Staatsw. Vorles. Churpf. Phys. Oek. Ges. I (1791) p. 202 (not seen) — *Convolvulus* sect. *Calystegia* (R. BR.) BENTH., Fl. Austr. IV (1869) p. 428, 430.

Prostrate or twining, perennial herbs. Leaves petiolate, mostly glabrous, entire or lobed, the base sagittate to hastate. Flowers axillary, solitary or in few-flowered cymes. Bracts 2, mostly large, foliaceous, broad-ovate, often inflated, embracing the calyx. Sepals 5, subequal, ovate to oblong, acute or obtuse, herbaceous. Corolla medium-sized or large, glabrous, campanulate to funnel-shaped, slightly lobed or subentire, white or pink or rarely yellowish, outside with 5 distinct midpetaline bands. Stamens and style included; filaments subequal, pollen globular, smooth; style filiform, stigmas 2, mostly oblong or elliptic, complanate, ovary 1-celled or imperfectly 2-celled, 4-ovuled. Capsule globose, 4-valved, 4-seeded; seeds black, smooth or verrucose.

Distribution: Warm and temperate regions.

Only species in Malaysia:

Calystegia hederacea Wall. in Roxb., Fl. Ind. II (1824) p. 94 (not seen); id., Cat. (1828) n. 1328; Choisy in Mém. Soc. Phys. Genève VIII (1837) p. 485; id. in DC., Prodr. IX (1845) p. 434; Miq., Fl. Ned. Ind. II (1857) p. 625; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 217; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 111; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 509; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 99; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 299; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 105; Ridley, Fl. Malay Penins. II (1923) p. 454 — *Convolvulus Wallichianus* Spr., Syst. IV, 2 (1827) p. 61 — *C. acetosaefolius* Turcz. in Bull. Mosc. (1840) p. 73 (not seen) — *Calystegia acetosaefolia* Turcz., Fl. Baic.-Dahur. II, 2 (1856) p. 289, in nota (not seen) — *Volvulus hederaceus* (Wall.) O. K., Rev. Gen. II (1891) p. 447 — *Calystegia abyssinica* Engl. in Abh. Preuss. Akad. Wiss. 1891, II (1892) p. 347 (not seen).

A probably perennial herb, stems slender, prostrate or twining, glabrous. Leaves glabrous, 1.5—4(—7.5, Prain) cm long, 0.5—2(—2.5, Prain) cm broad, oblong to triangular, obtuse or slightly emarginate at the apex, sagittate to cordate at the base, the basal auricles more or less spreading, entire or 2-lobed; the petiole shorter than or nearly as long as the blade. Flowers axillary, solitary, the peduncle 2—5 cm long; bracts 2, enclosing the sepals, elliptic, obtuse, 6—8 mm long, persistent. Sepals 5, oblong, obtuse, mucronulate, glabrous, the outer ones about 6(—7.5, Prain) mm long, the inner ones somewhat shorter. Corolla campanulate, pinkish-purple (Prain), about 2 cm long, the limb subentire; stamens and style included, filaments slightly unequal, dilated at the base, inserted close to the corolla base; disk low, cup-shaped; ovary glabrous, conical; style filiform, stigmas elongate. Capsule (Prain) ovoid, subacute, glabrous, 7.5 mm long; seeds glabrous.

Malay Peninsula, Penang, Wallich 1328/2, collected by Porter (S). According to Prain possibly only a casual weed.

Distribution: Africa (Abyssinia), Asia (from Punjab and Afghanistan to N. and E. Bengal, Penang, and to China, Japan and Amurland).

Calystegia sepium (L.) R. Br., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 483; Miq., Fl. Ned. Ind. II (1857) p. 624; Boerl., Handl. Fl. Ned.

Ind. II (1899) p. 509; KOORDERS, Exk. fl. Java III (1912) p. 111 — *Convolvulus sepium* L., Spec. Plant. ed. 1 (1753) p. 153 — *Volvulus sepium* (L.) JUNGER in Oesterr. Bot. Zeitschr. XLI (1891) p. 133.

Although this species has been recorded from Java by MIQUEL and after him by BOERLAGE and by KOORDERS, it is neither represented in the large collections from that island in the herbaria at Buitenzorg and at Leiden nor in one of the other collections I could examine. I, therefore, believe that MIQUEL's citation of Java is incorrect and that it has never been collected in that island.

Calystegia affinis ENDL. The specimen HOLLRUNG 155, collected in New Guinea, Finschhafen, and mentioned by SCHUMANN in ENGL., Bot. Jahrb. IX (1887) p. 216 under *Calystegia affinis* ENDL., Prodr. Fl. Norfolk. (1833) p. 51, n. 103, belongs to *Ipomoea gracilis* R. BR. (= *I. denticulata* (DESR.) CHOISY). See SCHUM. and LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 516.

XII. SHUTEREIA CHOISY

CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 485, t. 2, fig. 11, non *Shuteria* WIGHT et ARNOTT, 1834; id., in DC., Prodr. IX (1845) p. 435; HOUSE in Bull. Torr. Bot. Club XXXIII (1906) p. 318 — *Hewittia* WIGHT et ARNOTT in Madr. Journ. Sc. Ser. I, V (1837) p. 22 (not seen); MIQ., Fl. Ned. Ind. II (1857) p. 620; BENTH. et HOOK., Gen. Plant. II (1876) p. 873; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 216; BAILLON, Hist. Pl. X (1891) p. 324; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 32; CHODAT et ROULET in Bull. Herb. Boiss. I (1893) p. 191; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 581; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 225; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 499, 509; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 100; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 300; KOORDERS, Exk. fl. Java III (1912) p. 111; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 298; RIDLEY, Fl. Malay Penins. II (1923) p. 455; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 359; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 515 — *Palmia* ENDL., Gen. Pl. (1839) p. 653.

Herbaceous, pubescent plants, twining or prostrate. Leaves entire, angular or lobed, cordate. Flowers axillary, solitary or in few-flowered cymes. Bracts 2, oblong- or linear-lanceolate, acuminate, at some distance from the calyx. Sepals 5, acute, herbaceous, three outer ones larger, ovate, accrescent in fruit, two inner ones much smaller. Corolla medium-sized, campanulate to funnel-shaped, 5-angled, pale yellow or white, mostly with a purple eye. Stamens 5, included, filaments linear with dilated base; pollen smooth. Disk ring-shaped. Ovary hairy, 1-celled or imperfectly 2-celled at the top; ovules 4; style filiform, included; stigmas 2, ovate-oblong, complanate. Capsule 1-celled, more or less distinctly 4-valved, 4- or less-seeded. Seeds black, glabrous, opaque.

Distribution: Tropical Africa, tropical Asia, Malaysia and Polynesia.

Remarks. In recent literature we generally find the name *Hewittia* WIGHT et ARNOTT (1837) for this genus. *Shutereia* CHOISY (1833) is, however, an earlier name and is adopted here. In consequence the name *Shuteria* WIGHT et ARNOTT (1834), a genus of *Leguminosae*, has to be altered.

One species in Malaysia:

Shutereia sublobata (L. f.) HOUSE in Bull. Torr. Bot. Club XXXIII (1906) p. 318 — *Convolvulus sublobatus* L. f., Suppl. (1781) p. 135 — *C. bracteatus* VAHL, Symb. III (1794) p. 25 — *C. bicolor* VAHL, Symb. III (1794) p. 25; CURT., Bot. Mag. (1821) t. 2205; ROXB., Fl. Ind. ed. CAREY et WALL. II (1824) p. 57; id., Fl. Ind. I (1832) p. 475 (mentioned by ROXBURGH as *C. bicolor* WILLD.) — *Ipomoea Weinmanni* R. et S., Syst. IV (1819) p. 243 — *I. malabarica* auct. non R. et S.; BL., Bijdr. (1825) p. 715 — *I. bracteata* (VAHL) R. et S., Syst. IV (1819) p. 227; BL., Bijdr. (1825) p. 711 (mentioned by BLUME as *I. bracteata* VAHL) — *Shutereia bicolor* (VAHL) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 48, t. 2, fig. 11; id. in DC., Prodr. IX (1845) p. 435; VAN HOUTTE, Fl. des Serres IV (1848) t. 421; CHOISY in ZOLL., Syst. Verz. 2. Heft (1854) p. 130, 133 (*Shuteria bicolor*) — *Convolvulus hederaceus* BLANCO, Fl. Filip. ed. 1 (1837) p. 90; id., ed. 2 (1845) p. 66 (not seen); id., ed. 3, I (1877) p. 124, non L. (according to MERRILL, Spec. Blanc. (1918) p. 326) — *Hewittia bicolor* (VAHL) WIGHT et ARN. in Madr. Journ. Sc. Ser. I, V (1837) p. 22 (not seen); WIGHT, Icon. III (1843) p. 45, t. 835 (*Heivetia bicolor*); id., Illustr. II (1850) t. 168 b, fig. VI (*Hewetia*); MIQ., Fl. Ned. Ind. II (1857) p. 620; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 216; HEMSL., Rep. Chall., Bot. I, 3 (1884) p. 170; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 197; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 226; HALL. f. in Versl. 's Lands Plantent. 1895 (1896) p. 126; id. in Bull. Herb. Boiss. V (1897) p. 379, 380; KOORDERS in Meded. 's Lands Plantent. XIX (1898) p. 542; BOERL., Handl. Fl.

Ned. Ind. II (1899) p. 509; Hall. f. in Bull. Herb. Boiss., sér. 2, I (1901) p. 675; Baker and Wright in This.-Dyer, Fl. Cap. IV, 2 (1904) p. 68; Cooke, Fl. Bombay II (1905) p. 231; Baker and Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 100; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 300; Merrill in Philipp. Journ. Sci. I (1906) Suppl. p. 120; Koorders, Exk. fl. Java III (1912) p. 111; Koorders-Schum., Syst. Verz. (1910—13), Conv. p. 2; id. (1914) p. 109; Gagnep. et Courch. in Lec., Fl. Indo-Chine IV (1915) p. 298, 299, fig. 34; Gamble, Fl. Pres. Madras V (1923) p. 924; Ridley, Fl. Malay Penins. II (1923) p. 455, fig. 117 — *Aniseia Afzelii* Don, Gen. Syst. IV (1838) p. 295 — *Ipomoea ? teretistigma* Choisy in DC., Prodr. IX (1845) p. 373 — *I. panduraeformis* Drège mss. ex Choisy in DC., Prodr. l.c. p. 435, pro synon. — *Shutereia bicolor* (Vahl) Choisy var. *abbreviata* Choisy in DC., Prodr. l.c. p. 435 — *Aniseia bracteata* (Vahl) Hassk., Pl. Jav. Rar. (1848) p. 516 — *Hewittia asarifolia* Klotzsch in Peter, Reise Mossamb. Bot. (1862) p. 242 — *H. hirta* Klotzsch l.c. p. 243 — *H. sublobata* (L. f.) Kuntze, Rev. Gen. (1891) p. 441; Hall. f. in Engl., Bot. Jahrb. XVIII (1894) p. 111; Bold., Zakfl. Java (1916) n. 802; Merrill, Spec. Blanc. in Bur. of Sc. Publ. 12 (1918) p. 326; id., Enum. Philipp. Fl. Pl. III (1923) p. 359; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 515 — *H. Barbeyana* Chod. et Roulet in Bull. Herb. Boiss. I (1893) p. 192 — *Ipomoea benguelensis* Baker in Kew Bull. (1894) p. 69 — *I. phyllosepala* Baker l.c. — *Bonamia Volkensii* Dammer in Engl., Pfl. Ost. Afr. C (1895) p. 329.

A herbaceous plant with slender, prostrate or twining stems, 1—2 m long (Backer), more or less densely pubescent, glabrescent, angular, occasionally rooting. Leaves petiolate, petiole pubescent, 1—6 cm long; blade ovate to broad-ovate in outline, appressed pilose with short hairs on both sides, especially beneath, or nearly glabrous, 3—12 cm long, 4—10 cm broad, cordate or sometimes truncate at the base, the auricles entire or angular, sometimes spreading and then the blade more or less hastate; the apex acuminate, acute or obtuse, mucronulate. Peduncles shorter or longer than the petioles, 1—10 cm long, pubescent, upwards often more densely, 1- or sometimes 2—3-flowered; bracts 0.5—1.5 cm long, oblong-lanceolate or narrower, much exceeding the very short, up to 3, in fruit up to 5 mm long pedicels. Sepals more or less hairy on their surface and along their margins, unequal, the two outer ones much larger than the inner, broad to narrow-ovate, acute or obtusish, 9—15 mm, later to 17 mm long, the third more or less oblique, the fourth and fifth smaller, ovate with broadened and scariously margined base, 7—7.5 mm long; nerves of sepals prominent in fruiting stage. Corolla campanulate to funnel-shaped, 2—2.5 cm long, creamy white to yellow or greenish yellow, often with a purple or reddish brown centre and with 5 pale yellow, pilose midpetaline bands, the limb with 5 very short, rounded, emarginate, mucronulate lobes. Stamens included. Filaments inserted about 4 mm above the corolla base, their base broadened and minutely papillose. Ovary densely hairy with long white hairs, also some hairs at the style base. Disk low, shallowly lobed, pale yellow (Backer). Capsule depressed-globose to more or less quadrangular, crowned by the style, patently pilose, about 8 mm high and about 10 mm broad, irregularly dehiscent by valves. Seeds 4—2, black, opaque, glabrous, except the pubescent hilum, 5—6 mm long.

Malay Peninsula, Perak, Larut, Scortechini (according to Prain); Malacca, Malacca Hill, near the chapel, Ridley s.n. (S).

Sumatra, Atjeh and Dependencies, valley of Aloer Lampahan, wayside, van Steenis 6072, Aug. 1934 (B); East Coast, Gedong djohore, S. of Medan, 50 m, not rare in low thickets and grassy places, Lörzing 3531, Febr. 1915 (B); Sibolangit, 500 m, rather rare, in thickets, Lörzing 4484, Nov. 1916 (B, L); E. of Loeboekpakam, 20 m, rather rare, in thickets and grassy places, Lörzing 3296, Oct. 1914 (B); near Limang, W. of Kabandjahe, in the forest Sampaharoe, 550 m, Galoengi 227, April 1919 (B); West Coast, Padang, without collector's name, n. 230 (B); Padang, Korthals 234 (L); G. Malintang, foot, 800 m, wayside, in thickets, Bünnemeyer 4450, Aug. 1918 (B); Lampoengs, near Telok, Zollinger 3038 (BD).

Java, from West to East Java, in the lower parts of the island, in grassy fields, thickets and hedges, along dikes and waysides locally rather frequently (Backer). Without precise locality, Blume 59, 1002 (L); Hoffmannsegg s.n., named *Batatas bibracteata* Klotzsch (BD); Horsfield, Conv. 7 (K); id., s.n. (L, U); Jagor 589 (BD); Junghuhn s.n. (L); Bantam, Pandeglang, 300 m, wayside, Backer 7386, March 1913 (B); id., 200 m, on hedge, Backer 7430, March 1913 (B); between Malingping and Penjawoengan, 5 m, grassy wayside, Backer 1533, June 1911 (B); S.E. of Pasaoeran, 200 m, waysides, thickets, Backer 7250, March 1913 (B); Batavia, Batavia, Kuhl and van Hasselt s.n. (L); id., Pengoedjian, 5 m, grassy wayside, Backer 32301, June 1903 (B); Laanhof, S.W. of Weltevreden, 20 m, grassy fields, Backer 32300, July 1902 (B); Meester Cornelis, 20 m, grassy field, Backer 32302, Aug. 1904 (B); Bidara tjina, S. of Meester Cornelis, 20—25 m, Edeling s.n. (B); N. of Wanajasa, 500 m, grassy wayside, Backer 14355, June 1914 (B); Tjikoempai, E. of Poerwakarta, 110 m, Harmsen 118, Dec. 1921 (B); Buitenzorg, Buitenzorg, 250 m, along railroad, Backer 26039, Sept. 1918 (B); Buitenzorg, 230 m, on hedge, Hallier 205a, Apr. 1893 (B); id., thickets and grassy places behind Kampong tjina, along road to Batoetoelis, Hallier 205b, Nov. 1894 (B); Buitenzorg, 235 m, on hedges, between Witte paal and Tanah Sereal, Hallier s.n., May 1895 (B, L); Depok, 93 m, Burck and de Monchy s.n. (B); Koeripan, limestone, Blume s.n. (L); Dramaga, W. of Buitenzorg, wayside, bamboo thicket, 250 m, Bakhuizen van den Brink Jr. 2112, Jan. 1923 (B, L); Pasir Gaok near Tjimoelang, N.W. of

Buitenzorg, 250 m, thickets, wayside, Bakhuizen van den Brink 5446, Apr. 1922 (B, BD, K, L); Tjiseëng, 100 m, limestone hills, in thickets, Beumée A 922, May 1932 (B); Palaboeanratoe, Tjidaoen, beach, Koorders 34663 β, Apr. 1899 (B); Tji Solok, Wijnkoopsbaai, 5 m, grassy field, Backer 724, Dec. 1911 (B); Tjiletoeh, Zandbaai, 1 m, grassy wayside, Backer 25658, Aug. 1918 (B); Kalapanoenggal, 100 m, grassy wayside, Backer 5790, Dec. 1912 (B); Babakan, Lehmann s.n. (BD); cultivated in the Botanic Garden, Buitenzorg, n. XV. H. 39 and 39 A (according to Hallier); id. n. XV. K. B. XI. 2 (B); Priangan, Garoet (?), Burck (?) s.n. (B); Rawah Lakbok near Bandjar, 40 m, Backer 4209bis, Aug. 1912 (B); Soekaradja, S. of Tasikmalaja, 250 m, grassy wayside, Backer 8523, Aug. 1913 (B); Cheribon, between Haoergeulis and Tjipoenegara, 25 m, dike of railroad, Backer 16846, Oct. 1914 (B); Pekalongan, Soebah, Koorders 27338β, Apr. 1897 (B); id., 200 m, in teak-wood, Beumée 4311, July 1919 (B); Batang, 5 m, grassy wayside, Backer 15499, Sept. 1914 (B); Doekoewringin near Slawi, 45 m, administrator sugar-estate Doekoewringin 83, Febr. 1915 (B); Banjoemas, Kievits 1857 (Pa); Kievits 3469 (Pa); Tjilatjap, grassy field along Serajoe, 1 m, Backer 4577, Sept. 1912 (B); Kedoe, Keboemen, 25 m, bamboo hedge, Brinkman 531, Dec. 1932 (B); Semarang, Semarang, Horsfield s.n. (according to Miquel); Mangkang, between Semarang and Kaliwoengoe, wayside in teak-wood, Docters van Leeuwen s.n., May 1910 (B); forestry Manggar, 50 m, teak-wood on marl, Beumée 5452, Dec. 1920 (B); virgin forest, Kedoengdjati, Koorders 24899 β, Sept. 1896 (B, L); Kali Woengoe, 5 m, Backer 16475, Sept. 1914 (B); Djapara-Rembang, Ngarengan, Koorders 33505 β, May 1899 (B); id., Koorders 33506 β, May 1899 (B); id. Koorders 35610 β, May 1899 (B); id., Koorders 35613 β, May 1899 (B); forestry Bekoetoek, 250 m, tertiary lime-marl, Blokhuis s.n., July 1918 (B); Kediri, E. slope G. Wilis, above Madja, 300 m, grassy wayside, Backer 11633, Febr. 1914 (B); Gadoengan Pare, 300—500 m, Koorders 22891 β, June 1896 (B, L); Soerabaja, Soerabaja, Dorgelo 427, May 1922 (Pa); id., Dorgelo 746, July 1922 (Pa); id., 5 m, grassy field, Backer 4180, June 1912 (B); Djombang, without collector's name (Pa); Malang, Lawang, 700 m, Mousset 813 (B); Djatiroto, 29 m, Vermeulen 6, June 1921 (B); id., 25 m, railroad in forest, Backer 7834, May 1913 (B); id., 20 m, railroad, Backer 8048, May 1913 (B); Besoeki, Soemberwringin, E. of Bondowoso, 650 m, grassy wayside, Backer 9486, Oct. 1913 (B); Djember, 85 m, Ultée s.n. (B); N.E. of Djember, 150 m, grassy wayside, Backer 17762, Dec. 1914 (B); Poeger, 10 m, shady wayside, Backer 18242, Dec. 1914 (B); Poeger-Watangan, Koorders 20925 β, Oct. 1895 (B); id., Koorders 21022 β, Oct. 1895 (B); id., 5 m, on sand, Koorders 21082 β, Oct. 1895 (B); G. Ikan, near Banjoewangi, on limestone rocks, Zollinger 2898 Z. M., May 1845 (B, BD); Madoera, Bangkalan, 5 m, grassy wayside, Backer 19097, Febr. 1915 (B); Ketapangdaja, 15 m, grassy wayside, Backer 20026, March 1915 (B); between Djelgong and Moktisari, 50—100 m, grassy waysides, Backer 20038, March 1915 (B); between Rapa and Moktisari, 100 m, on hedge, Backer 20162, March 1915 (B); hills N. of Pagantenan, 150 m, grassy wayside, Backer 20588, March 1915 (B); Amboenten, 5 m, grassy wayside, Backer 21223, July 1916 (B); Kangean Archipelago, Kangean, Tambajangan, 130 m, grassy field, Backer 27487, March 1919 (B).

Borneo, S. and E. division, Bandjermasin, Motley 606 (K).

Celebes, Celebes and Dependencies, S.W. Celebes, Lambasang, 950 m, wayside, Bünnemeyer 11150, Apr. 1921 (B); Baoelo near Lambasang, 950 m, wayside, Bünnemeyer 11289, May 1921 (B); Tjampalagian, Rachmat 238 (exp. van Vuuren), July 1913 (B); Pasar Dadjo, Rachmat 766 (exp. van Vuuren), Oct. 1913 (B); Bontoparang, 50 m, wayside, Bünnemeyer 10663, March 1921 (B); E. Celebes, Kendari, Kjellberg 806, March 1929 (B); Manado, near Amoerang, very rare, Koorders 16557 β, March 1895 (B, BD, L); Sibalaja, 20 m, Donggala 32, Jan. 1929 (B).

Bali, S. Bali, Kintamani, 1400 m, de Voogd sub 2502 (on a sheet with *Porana racemosa* Roxb.), May 1936 (B).

Lombok, Rindjani, N. side, Laboehan tjareh, 0—20 m, on dry soil, Elbert 622, Apr. 1909 (L); id., Bajan, 125—225 m, on sand, Elbert 660, Apr. 1909 (L).

Soembawa, Bima, Donggo, Kenanta, 100—300 m, in dry region, Elbert 3579, Dec. 1909 (L).

Flores, Ende, 50 m, dry Cocos grove, Mrs. Rensch 1003, June 1927 (B, BD); Manggarai, 700 m, thicket, de Voogd 2847, Sept. 1936 (B).

Timor, without precise locality, without collector's name (L); Jonker 326, Apr. (U); Koepang, R. Brown s.n., Apr. 1803 (S); id., Hombron s.n., Voyage de l'Astrolabe et de la Zélée, 1841 (P); Teysmann s.n. (B); N. Middle Timor, Noïl Toko, 500 m, Walsh 389, May 1929 (B); S. Middle Timor, Kolbauo, sea-shore, Walsh 476, Apr. 1929 (B); Portuguese Timor, Delhi, without collector's name, n. 8 (B).

Wetar, Treub 545 (B).

Leti, Treub 491 (B).

Moluccas, Ternate, N. Castella, 100 m, in thickets, Beguin 1603, May 1921 (B, L); Timorlaoet (according to Hemsley, 1884).

New Guinea, Territory of New Guinea, Lauterbach 3031, July 1899 (BD).

Philippine Islands. "Throughout the Philippines in open grasslands and waste places, at low and medium altitudes, often common" (Merrill). Without precise locality, Perrottet s.n. (L); Cuming 1891 (K); Luzon, Prov. of Ilocos Norte, Bangui, Ramos, Bur. of Sc. 27605, Febr.-March 1917 (B); Prov. of Benguet, Sablang, Fenix, Bur. of. Sc. 12769, Nov.-Dec. 1910 (S); Prof. of Union, Bauang, Elmer 5643, Febr. 1904 (BD, K); Prov. of Nueva Vizcaya, vicinity of Dupax, Mac Gregor, Bur. of Sc. 11394, March-Apr. 1912 (L); Prov. of Nueva Ecija, between San Jose and Carranglang, trailing in grass on damp open soils, Merrill 241, May 1902 (BD); Rizal prov., Manila, Barthe s.n. (P); id., Merrill, Bur. of Sc. 5173, Febr. 1906 (B, BD, K, L); id., Merrill, Spec. Blanc. 698, Jan. 1915 (B, BD, K, L); Prov. Laguna, Los Baños, Elmer, 8118, Apr. 1906 (B, K); id., Los Baños, Mt. Maquiling, Elmer 18469, June-July 1917 (B, K, L, U); Mindoro, Merrill 1266, Jan. 1903 (BD); Mindanao, Camiguin Islands, Moseley s.n., Challenger Exped., Jan.-Febr. 1875 (K); Camaguin (Camiguin?) de Mindanao, Ramos, Bur. of Sc. 14498, March-Apr. 1912 (S).

Distribution: Trop. Africa, south to Natal; trop. Asia (British India, Ceylon, Indo-China, N. to China), Malaysia, Polynesia.

Vernacular names: kamet (Pekalongan, Koorders); sembanjan (Jav., Pekalongan, administrator sugar-estate Doekoewringin); indjeng nan (?) (Kediri, Koorders); lawatan (Jav., Backer); oewi malojon (Tontemboan-language, Manado, Celebes, KOORDERS); banaíyan, palupasagig (Philipp., Panay Bisáya language, MERRILL); dinukdukto (Philipp., Igorot language, MERRILL); panggipanggi (Philipp., Súlu language, MERRILL).

XIII. MERREMIA DENNST. ex HALL. f.

DENNST., Schlüss. Hort. Malab. (1818) p. 12, 23, 34 (nomen nudum); HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 581; PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1895) p. 377; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 501, 509; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 101; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 302; KOORDERS, Exk. fl. Java III (1912) p. 111; RIDLEY, Fl. Malay Penins. II (1923) p. 456; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 360; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 515 — *Skinneria* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 487, t. 6; id. in DC., Prodr. IX (1845) p. 435; MIQ., Fl. Ned. Ind. II (1857) p. 487 — *Spiranthera* BOJ., Hort. Maurit. (1837) p. 226, p.p. (not seen).

Plants of various habit, mostly herbaceous or woody twiners, but also prostrate or erect herbs or low erect shrubs. Leaves very variable, entire, dentate, lobed or palmately or pedately partite or compound, rarely very small and subulate (not in Malaysia). Flowers axillary, solitary or in few- to many-flowered variously ramified inflorescences. Bracts usually small. Sepals 5, usually subequal, elliptic to lanceolate, acute or acuminate or ovate to orbicular, obtuse or emarginate, concave, in several species enlarged in fruit. Corolla funnel-shaped or campanulate, mostly glabrous, white or yellow to orange, generally with 5 distinctly nerved midpetaline bands; the limb slightly 5-lobed. Stamens and style included. Anthers often contorted; filaments filiform, often unequal; pollen smooth. Ovary 2- or 4-celled, rarely incompletely 2-celled, 4-ovuled; style filiform; stigma biglobular. Fruit a capsule, generally dehiscing by 4 valves or more or less irregularly dehiscing, 4—1-celled, 4- or by abortion less-seeded. Seeds glabrous, pubescent or villose, especially at the margins.

Distribution: Widely spread in the tropics of both hemispheres.

Remarks. 1. The name *Merremia* was published for the first time by DENNSTEDT, Schlüss. Hort. Malab. (1818) p. 12, 23, 34 in the combination *Merremia convolvulacea*, a nomen nudum. DENNSTEDT based the species on a plate of RHEEDE's Hortus Malabaricus (vol. VIII, tab. 27), where we also find a description. According to the International Rules of Nomenclature DENNSTEDT's name is not validly published. Later on, in 1893, HALLIER validated the name given by DENNSTEDT using it for a genus, distinguished by him, which genus contains besides *M. convolvulacea* (= *M. hederacea* (BURM. f.) HALL. f.) several other species. In the mean time the genera *Skinneria* and *Spiranthera* had been created, respectively by CHOISY (1833) and by BOJER (1837), each based on species afterwards removed to *Merremia* in the sense of HALLIER. Both names are, however, illegitimate and must be rejected, as there exists already a *Skinnera* FORST. (1776), a genus of *Onagraceae* and a *Spiranthera* ST. HIL. (1823), a genus of *Rutaceae*. Consequently the name *Merremia* DENNST. ex HALL. f. (1893) can be maintained.

2. A thorough monographical revision is necessary to get a good idea about the subdivision of the genus *Merremia*. For the time being, we accept the subdivision given by HALLIER, with some slight alterations. It is, however, possible that a further knowledge of the genus will lead to a new arrangement of the species. In that case it will be of importance to consider the types of HALLIER's sections as far as possible as the types of the sections in their new limitation. HALLIER subdivided the genus into the following sections:

a. *Skinneria* (CHOISY) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 118 — *Skinneria* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 487; id. in DC., Prodr. IX (1845) p. 435; non *Skinnera* FORST. (1776). Type-species: *Merremia hirta* (L.) MERRILL (= *Skinneria caespitosa* (ROXB.) CHOISY).

b. *Streptandra* HALL. f. in ENGL., Bot. Jahrb. XVIII (1894) p. 114. Type-species: *Merremia tridentata* (L.) HALL. f.

c. *Xanthips* (GRISEB.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id., in ENGL., Bot. Jahrb. XVIII (1894) p. 112 — *Ipomoea* L. sect. *Xanthips* GRISEB., Fl. Brit. West Ind. Isl. (1864) p. 470. Type-species: *Merremia umbellata* (L.) HALL. f.

d. *Hailale* HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 379. Type-species: *Merremia peltata* (L.) MERRILL.

As to the names of these sections, *Skinneria* (CHOISY) HALLIER, based on the genus *Skinneria* CHOISY (1833) has to be rejected, as there exists already an earlier homonym *Skinnera* FORST. (1776), as said above. As the section *Skinneria* in the sense of HALLIER contains the type-species of the genus *Merremia*, *M. hederacea* (BURM. f.) HALL. f. (= *M. convolvulacea* DENNST.), I propose to change the name into Sect. *Eu-Merremia* VAN OOSTSTR., nom. nov. A fifth section,

e. *Wavula* VAN OOSTSTR., has been described by the author in Blumea III (1939) p. 266. Type-species: *Merremia similis* ELMER.

Key to the species.

1a. Leaves palmately lobed to palmately compound with 5—7 segments or leaflets 12
b. Leaves neither palmately lobed nor compound 2
2a. Pedicels with a thick lobed ring immediately below the calyx. Flowers large; sepals obovate to broad-elliptic or orbicular, obtuse or retuse, to 15—18 mm long; corolla c. 4 cm long . . . . **22. M. similis**
b. Pedicels without thickened ring at apex 3
3a. Leaves peltate (occasionally with exception of the leaves of the inflorescences) 21
b. Leaves never peltate 4
4a. Midpetaline bands of corolla hairy externally or only at the top . . . 16
b. Corolla completely glabrous externally 5
5a. Flowers in axillary clusters or solitary in the leaf-axils; peduncle very short or nearly absent; pedicels short, 2—4 mm; sepals obovate to orbicular or subquadrate, outer ones obtuse with cucullate and distinctly mucronate top, 2.5—3 mm long, inner ones deeply emarginate, 3—4(—6) mm long, all long ciliate at the margins and hairy on the back; corolla not exceeding 10 mm, yellow, the midpetaline bands with dark lines. Leaves kidney-shaped to broad-ovate. Prostrate herb . . . . **5. M. emarginata**
b. Peduncles longer 6
6a. Sepals 10 mm or mostly shorter 7
b. Sepals longer than 10 mm 18
7a. At least the inner sepals acute, attenuate-acuminate into a slender point. Leaves of various forms (see Fig. 2, J—O) . . . . **6. M. tridentata**
b. Sepals obtuse 8
8a. Twining or prostrate, herbaceous or rarely woody plants. Midpetaline bands of corolla with distinct dark lines 9
b. Larger woody twiners. Midpetaline bands of corolla without distinct dark lines 17
9a. Sepals slightly unequal in length. Outer sepals broadly obovate to orbicular or broadly spathulate, concave 10
b. Sepals unequal in length. Outer sepals shorter, elliptic, to oblong-elliptic or oblong, less concave or flat 11
10a. Outer sepals broadly obovate to orbicular, emarginate, not or slightly mucronulate, generally hairy, 4—7 mm long; inner ones 6—8 mm (Fig. 1, g). Corolla 1.5—2 cm long, yellow. Capsule depressed-globose, valves coarsely wrinkled (Fig. 1, h). Petiole generally without tubercles . **1. M. gemella**
b. Outer sepals generally glabrous, 3.5—4 mm long, broadly obovate to spathulate, broadly notched at the apex and distinctly mucronulate; mucro directed outward; inner sepals to 5 mm long (Fig. 1, e). Corolla 1 cm or less, yellow. Capsule depressed-globose or broadly conical, somewhat 4-angular, less coarsely wrinkled (Fig. 1, f). Petiole often with small tubercles . **2. M. hederacea**
11a. Outer sepals elliptic, 3—4 mm long, inner ones oblong or elliptic, 4.5—6 mm

long. Corolla 1.5—2 cm long, pale yellow or whitish. Capsule broad-ovoid to globular, smooth (Fig. 1, k). Peduncles filiform; bracts of inflorescence minute, 1—2 mm. Leaves variable in form, linear, linear-oblong, oblong-lanceolate, oblong to ovate-oblong or ovate (Fig. 2, P—Z); the base rounded, truncate, cordate or hastate . . . . **3. M. hirta**

b. Outer sepals oblong or oblong-elliptic, 4 mm long, inner ones broad-ovate or orbicular, 6 mm long. Corolla c. 1.8 cm long, white. Capsule subglobular, the valves reticulately wrinkled (Fig. 1, c). Peduncles thicker, bracts of inflorescence larger, to 4 mm long. Leaves larger, ovate (Fig. 1, b); the the base cordate. . . . . **4. M. dichotoma**

12a. Peduncles glandular in the upper part. Sepals narrow-ovate to oblong, obtuse, to 8 mm long. Corolla pale yellow, 2.5 cm long or less. Leaves palmately compound, with 5 leaflets . . . . **7. M. quinquefolia**

b. Peduncles glabrous or hairy, but not glandular. Sepals much longer, corolla larger 13

13a. Leaves palmately compound of 5 entire leaflets. Stems, peduncles, pedicels and outer sepals patently hirsute. Outer sepals ovate-lanceolate, acute or acuminate, 15—25 mm long. Corolla white, 2.5—3.5 cm long. Cultivated species . . . . **9. M. aegyptia**

b. Leaves palmately lobed or divided, sometimes nearly to the base, not palmately compound 14

14a. Plant completely glabrous. Leaves palmately divided to far below the middle with 7 entire, oblong-lanceolate segments. Outer sepals ovate to broad-ovate, obtuse, 23—25 mm long. Corolla yellow, 5.5 cm long . . **8. M. tuberosa**

b. Plants hairy 15

15a. Leaves palmately divided nearly to the base, segments 5—7, lanceolate, coarsely dentate to irregularly pinnately lobed. Peduncles patently hirsute, pedicels glabrous. Sepals ovate-lanceolate, acute, glabrous, 20—25 mm long. Corolla white with a rose or purple throat, 3—3.5 cm long. Cultivated species . . . . **10. M. dissecta**

b. Leaves palmately 5—7-lobed; lobes broad-triangular to lanceolate, coarsely dentate to crenate or subentire. Peduncles, pedicels and outer sepals patently hirsute. Sepals oblong or ovate-oblong, obtuse or acutish, 12—20 mm long. Corolla yellow, to 5—6 cm long . . . . **11. M. vitifolia**

16a. Corolla pilose at the upper parts of the midpetaline bands, white or yellow to orange, 2—3.5 cm long. Sepals broad-elliptic to orbicular, emarginate, 5—8 mm long. Inflorescences generally with short pubescent peduncles, mostly cymosely branched at the apex with short to very short branches, flowers consequently in umbelliform cymes, sometimes flowers solitary . . . . **12. M. umbellata**

b. Midpetaline bands of corolla densely sericeous outside; corolla white or yellow, c. 2 cm long. Outer sepals orbicular to transverse elliptic, broadly obtuse to retuse, 5—7 mm long, inner ones broadly transverse elliptic. Inflorescences with long peduncles, corymbosely ramified near the top . . . . **13. M. Boisiana**

17a. 2 Outer sepals broad-oblong, 7 mm long, 3 inner ones broadly elliptic to orbicular, 8—9 mm long; corolla yellow, 1.5 cm long. Leaves ovate to broad-ovate, base rounded; nerves 5—6 on each side of midrib. Woody twiner with slender stems . . . . **18. M. Clemensiana**

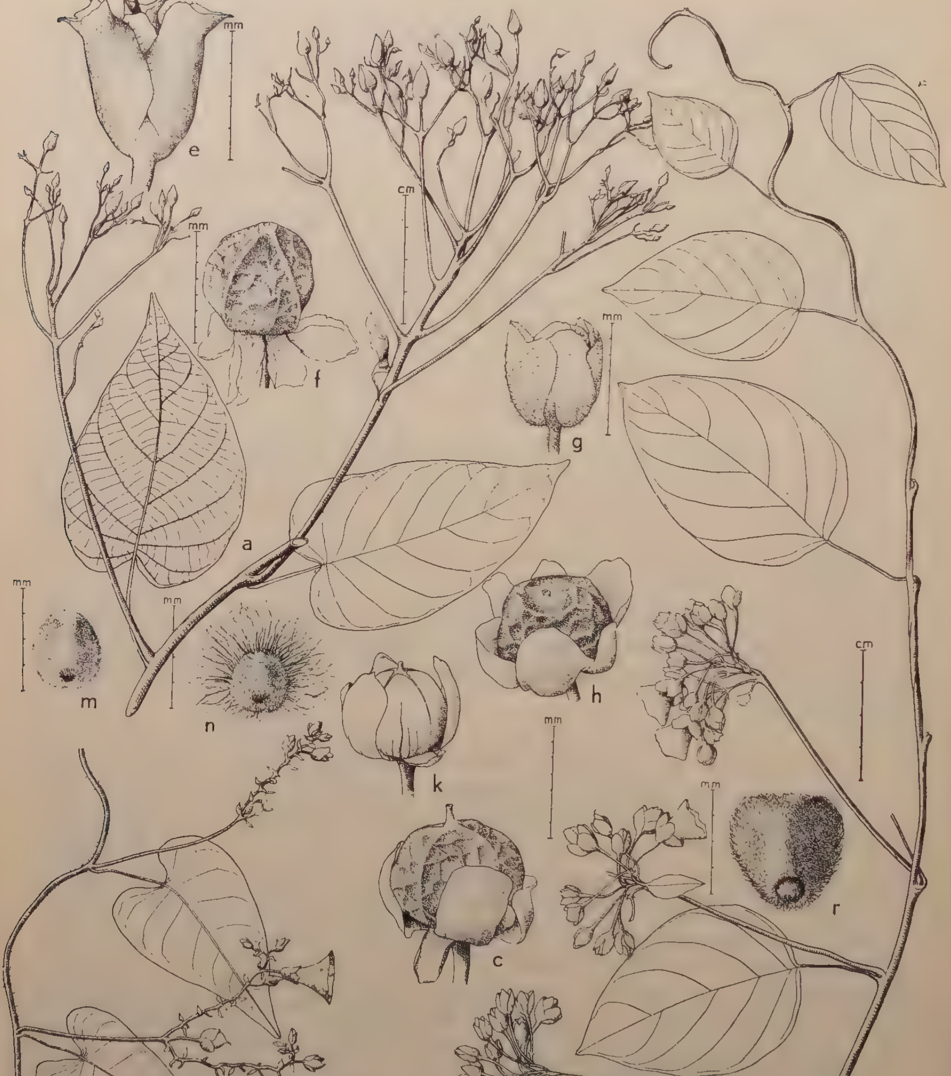

Fig. 1.

b. Sepals broad-elliptic to orbicular, outer ones 9—10 mm long; corolla yellow, 2—2.5 cm long. Leaves broad-ovate to orbicular, nerves 7—10 on each side of midrib. Woody twiner, stems thicker . . . . . . **19. M. Korthalsiana**

18a. Sepals 11—12 mm, outer ones broad-elliptic, inner ones broad-elliptic to orbicular; corolla c. 2.5 cm long. Flower-buds conical, acute. Leaves ovate, cordate at base, nerves impressed above, very prominent beneath. Woody twiner; stems lenticellate . . . . **17. M. crassinervia**

b. Sepals longer, 18 mm or more 19

19a. Corolla large, white, 7—8 cm long. Sepals large, the outer ones broad-ovate to broad-elliptic, inner ones narrower, 25—30 mm long. Stems herbaceous, smooth. Cultivated; probably occasionally escaped from culture . . . . **14. M. mammosa**

b. Corolla smaller 20

20a. Leaves orbicular to broad-ovate, apex cuspidate, base cordate; 8—10 nerves on each side of midrib. Sepals elliptic to broad-elliptic, 18—22 mm long; corolla 5.5—6 cm long. Stems woody, lenticellate . . . . **15. M. borneensis**

b. Leaves ovate, apex acuminate, base cordate; 6—7 nerves on each side of midrib. Sepals oblong or elliptic-oblong, 25—28 or the inner ones to 30 mm long; corolla 6 cm long. Stems woody, sparsely lenticellate . . **16. M. pulchra**

21a. Sepals less than 15 mm long; corolla 3—3.5 cm long . . . . **21. M. Elmeri**

b. Sepals 18—25 cm long; corolla 4.5—6 cm long . . . . . **20. M. peltata**

Section 1. **Eu-Merremia** van Ooststr. nov. nom.

Skinneria Choisy in Mém. Soc. Phys. Genève VI (1833) p. 487; id. in DC., Prodr. IX (1845) p. 435, non *Skinnera* Forst. (1776) — *Merremia* Dennst. ex Hall. f. sect. *Skinneria* (Choisy) Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 552; id. in Engl., Bot. Jahrb. XVIII (1894) p. 118.

Flower-buds oblong, elliptic or globular, obtuse; midpetaline bands of the corolla in dried state always with 5 dark lines; flowers rather small or small.

1. Merremia gemella (Burm. f.) Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 552; id. in Versl. 's Lands Plantent. 1895 (1896) p. 132; id. in Bull. Herb. Boiss. V (1897) p. 380; id. in Meded. 's Lands Plantent. XIX (1898) p. 544; Boerl., Handl. Fl. Ned. Ind. II (1899)

Fig. 1, a: *Merremia crassinervia* van Ooststr., branch of the type (L); b: *M. dichotoma* van Ooststr., branch of the type (B); c: *id.*, capsule; d: *M. Clemensiana* van Ooststr., branch of the type (B); e: *M. hederacea* (Burm. f.) Hall. f., calyx; f: *id.*, capsule; g: *M. gemella* (Burm. f.) Hall. f., calyx; h: *id.*, capsule; k: *M. hirta* (L.) Merrill, capsule; m: *M. hederacea* (Burm. f.) Hall. f., f. *pubescens* van Ooststr., seed; n: *id.*, f. *barbata* van Ooststr., seed; p: *M. umbellata* (L.) Hall. f. var. *orientalis* Hall. f., seed; r: *id.*, var. *occidentalis* Hall. f., seed.

p. 510; MERRILL in Philipp. Journ. Sc. I (1906) Suppl. p. 120; HALL. f. in VALETON, Pl. Pap. in Bull. Dep. Agric. Ind. Néerl. X (1907) p. 50; id. in Meded. Rijks Herb. Leiden 12 (1912) p. 14; KOORDERS, Exk. fl. Java III (1912) p. 112; HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 378; KOORD.-SCHUM., Syst. Verz. (1910—13), Conv. p. 2; id. (1914) p. 109; BOLD., Zakfl. Java (1916) n. 834; MERRILL in Philipp. Journ. Sc. XIX (1921) p. 374; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508; id., Enum. Philipp. Fl. Pl. III (1923) p. 360; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 519 — *Convolvulus gemellus* BURM. f., Fl. Ind. (1768) p. 46, t. 21, fig. 1 — *? C. striatus* VAHL, Symb. Bot. III (1794) p. 28 (type not seen) — *Ipomoea gemella* (BURM. f.) ROTH, Nov. Pl. Sp. (1821) p. 110 (not seen); CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 469; id. in DC., Prodr. IX (1845) p. 380; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 616; F.-VILL., Novis. App. (1880) p. 142 (not seen) — *I. radicans* BL., Bijdr., (1825) p. 712, non BERT. — *I. polyantha* MIQ., Fl. Ned. Ind. II (1857) p. 613; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 206; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 105; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 256; non *Convolvulus polyanthus* WALL. — *I. cymosa* (DESR.) R. et S. var. *radicans* (BL.) MIQ., Fl. Ned. Ind. II (1857) p. 613 — *? I. flava* MUELL. in BENTH., Fl. Austr. IV (1869) p. 424 (type not seen). Fig. 1, g—h.

A prostrate or twining herb, the stems to 3.00 m long (BACKER), 1—2 mm thick, covered with rather long, grey or white, curled, more or less appressed or sometimes patent hairs, especially at the nodes, afterwards glabrescent, sometimes already glabrous in youth; prostrate stems often rooting, roots at the nodes but also at the internodes. Leaves usually ovate or broad-ovate, rarely narrow-ovate to oblong in outline, in one case broad-ovate to kidney-shaped with broadly rounded apex (ELBERT 365, Java, Madioen, Trinil); the apex usually acuminate or gradually attenuate, the point obtuse or acute, mucronulate, sometimes slightly retuse; the base broadly cordate; the margin entire or coarsely crenate to dentate, sometimes 3-lobed; the leaf-blade glabrous on both sides or glabrous above and pilose beneath on the nerves or pilose on the nerves on both sides, occasionally pilose on both sides over the whole surface; the density of the hairs can vary to a great extent; the hairs are of the same kind as those on the stems; length of the blade 2.5—12 cm, width 1.5—10 cm; the petiole shorter than the blade or as long as it, with appressed hairs like those of the blade; length of the petiole 1.5—6, sometimes to 10 cm. Peduncles axillary, mostly covered with short curled hairs or glabrous, variable in length, 2.5—10, occasionally to 16 cm long, cymosely branched at the apex with one or with two dichasial ramifications, the terminal branches of the dichasium in the latter case often monochasial; pedicels with the same hairs as the peduncle, 3—6 mm long; bracts minute, deciduous. Flower-buds ovoid to globose, obtuse. Sepals thin-coriaceous with scarious margin, slightly unequal, the 2 outer and shorter ones more or less hairy over the whole length and sometimes at the margin, or only near the base or at the margin, or quite glabrous; the 3 inner and longer ones glabrous or sometimes hairy in the middle part, with glabrous margins; the sepals are strongly concave especially in bud, they are broadly obovate to orbicular, emarginate at the apex and crowned by a minute mucro, which may be absent; the outer sepals are 4—7 mm long, the inner ones 6—8 mm, in poorly developed specimens they are sometimes only about 4 mm long; the sepals are slightly enlarged in fruit. Corolla campanulate to funnel-shaped, glabrous, 1.5—2 cm long, yellow (sulphur yellow, pale yellow) with 5 distinctly 5-nerved midpetaline bands, the nerves are pellucid in living specimens (according to Backer), in dried specimens they are dark-coloured; the limb of the corolla is slightly 5-lobed, the lobes are slightly emarginate and minutely mucronate. Disk annular. Filaments filiform, broadened and hairy at the base, the margins decurrent on the corolla; length 10—11 mm. Ovary ovoid, glabrous; style filiform, glabrous, c. 11 mm long; stigma biglobular, papillose. Capsule depressed-globose, coarsely wrinkled in dried specimens, glabrous, about 7 mm high, 2-celled, 4—1-seeded. Seeds dark grey or brownish puberulent, trigonous or when only one seed develops globose.

Malay Peninsula, Perlis, Kangar, Henderson, Singapore Field n. 22911, Nov. 1929 (B, S).

Java, according to Backer from West to East Java, in the lower parts on moist soil, on bushes and hedges. Without precise locality, Junghuhn 38 (L); Korthals 275 (L); Batavia, Batavia, without collector's name, June 1846 (K); id. in herb. Burman, *type of Convolvulus gemellus* Burm.f. (Genève); id., Piepers s.n. (B); id., Blume 1123, *type of Ipomoea radicans* Bl. (L); E. of Batavia, in forest, de la Savinnierre 1167, Aug. 1878 (K); along railroad between Batavia and Tandjong Priok, Backer 34294, May 1903 (B); Weltevreden, Backer 34293 (B); N. of Weltevreden, Chinese churchyard, on *Carissa*, Hallier s.n., Aug. 1896 (B, L, U); Sabangan, Bakhuizen van den Brink fil. 3453, Sept. 1924 (B, L); Bidara tjina, Edeling? s.n. (B); Alkmaar, dike of rice fields, Mousset 436 (B); Buitenzorg, Buitenzorg, 250 m, Bakhuizen van den Brink fil. 1942, Oct. 1922 (B); id., Bakhuizen van den Brink fil. 2258, Febr. 1923 (B); cultivated in the Botanic Garden, n. 233 (L); Cheribon, Losarang, Backer 16762, Sept. 1914 (B); between Tjipoenagara and Haoergeulis, bushes, common, 25 m, Backer 16832, Oct. 1914 (B); Pekalongan, between Pekalongan and Pemalang, wayside, c. 3 m s.m., Backer 15666, Sept. 1914 (B); near Soebah, Koorders 36979 β, June 1899 (B); id., Koorders 37004 β, May 1899 (B); Brebes, dikes of rice fields, 5 m s.m., Backer 15296, Sept. 1914 (B); between Soebah and Weleri (Semarang), bushes, 50 m, Backer 16562, Sept. 1914 (B); Banjoemas, Rawah apoe opposite Kali Poetjang, damp grassland, c. 10 m, Backer 4481, Sept. 1912 (B); Kedoe, near Awoe-awoe, in grassy fields, Junghuhn 29, May (L); Semarang, Semarang, Docters van Leeuwen s.n., July 1910 (B); Kendal, dry wayside, 5 m, Backer 16320, Sept. 1914 (B); Mount Oengaran, Horsfield s.n. (L; U, *type of Ipomoea polyantha* Miq.); virgin forest G. Woelan, near Kedoeng djati, Koorders 24506 β, Sept. 1896 (B); Karangasen, Kedoeng djati, Koorders 28238 β, June 1897 (B, L); Tempoeran, teak-wood, Docters van Leeuwen s.n., May 1909 (B); near Grobogan, Koorders 28236 β, June 1897 (B); id., de Boer 18, May (B); sugar factory Trangkil near Tajoe, Houwing, herb. Koedoes n. 711 (Pa); sugar factory Langsee, without collector's name (Pa); Djapara-Rembang, Ngarengan, teak-wood, 50 m, Koorders 35608 β, June 1899 (B); Pasokan, Koorders 32916 β, June 1899 (B); Blora, border of rice field, frequent, c. 100 m, Beumée s.n., June 1917 (B); Koendoeran, teak-wood, c. 100 m, Beumée 5232, Aug. 1920 (B); Bekoetoek, teak-wood, c. 60 m, Blokhuis s.n. (B); Padangan, Wadeng, teak-wood, clearings, common, c. 100 m, Beumée 991, Aug. 1917 (B); Soerakarta, Klaten, 180 m, Leefmans 133 (B); Jogjakarta, Blitaran, Junghuhn 40 (L); Madioen, Madioen, 70 m, Koorders 23364 β, June 1896 (B); Ketapang, 5—25 m, hedges, common, Backer 21147, July 1915 (B); Karanganjer, Ngawi, common, clearings, on limestone, 150 m, Stoutjesdijk 34, June 1921 (B); Kendeng, Trinil, 50—150 m, Elbert 365 (L); sugar factory Soedhono, S. of Ngawi, Coert s.n., June 1925 (Pa); sugar factory Poerwodadi, c. 175 m, Coert 13, Apr. 1927 (Pa); Kediri, N. Kediri, Ngrajoeng, teak-wood, 125 m, Grutterink 3062, June 1918 (B); id., id., den Berger 476, Aug. 1918 (B); id., Toengloer, teak-wood, frequent, 125 m, Wind 2562, Apr. 1918 (B); id., id., teak-wood, 125 m, Wind 2528, Apr. 1918 (B); Soerabaja, Soerabaja, Dorgelo 427, 459, May 1922 (Pa); Wonokromo, van Slooten 2061, Sept. 1928 (B); Djombang, without collector's name (Pa); sugar factory Ngelom near Djombang, Bovien, herb. Djombang n. 67, Sept. 1923 (Pa); Djombang, Toenggodono hills, Bovien, herb. Djombang n. 4, Sept. 1923 (Pa); S. Soerabaja, Pakis, teak-wood on red volcanic soil, c. 100 m, Wolff von Wülfing 2309, Apr. 1918 (B); Malang, Pasoeroean, banks of river, 3 m s.m., Backer 7679, May 1913 (B); G. Baoeng near Lawang, 400 m, Bijhouwer 76, Aug. 1932 (B); Besoeki, Djember, Ultée 10 (B); alang field near Poeger, Watangari, common, 10 m, Koorders 21079 β, Oct. 1895 (B, L).

Borneo, S. and E. division, Bandjermasin, Korthals 231 (L); W. Koetai, near Moeara Kaman, on padang, Endert 1480, June 1925 (B); Long Wahau, Schlechter 13399, July 1901 (BD); Sarawak, Baram district, Baram, Hose 274, Oct. 1894 (K); British North Borneo, Clemens 11244 (according to Merrill, 1921).

Celebes, Manado, Manado, sea level, on fertile volcanic sand, Koorders 16556 β, Dec. 1894 (B, L); near Amoerang, Koorders 16553 β, March 1895 (B, L); id., Koorders 16554 β, Apr. 1895 (B, BD, K, L); bank of Lake Tondano, marshes, 700 m, Koorders 16555 β, Jan. 1895 (B, L); near Gorontalo, in rice fields, Forster 90 (L); Boeol, Sarasin 686, Aug. 1894 (BD); Celebes and Dependencies, Loewoe, Palopo, marshy soil, Kjellberg 1947, 1948, July 1929 (B); Bone, Pampanoea, Noerkas 88 (exped. van Vuuren), March 1912 (B, L). Celebes, Lagi-lagi, Rachmat 261 (exped. van Vuuren), July 1913 (B, L); Parampe, Rachmat 309 (exped. van Vuuren), July 1913 (B).

Lombok, Rindjani, S.S.E. slope, Pingabaya, 50—75 m, Elbert 2053, June 1909 (L).

Soembawa, W. Soembawa, 50 m, de Voogd 2562, June 1936 (B); Dompoe, dry bushes, common, 80 m, Mrs. Rensch 795, May 1927 (B).

New Guinea, Dutch New Guinea, Merauke, Koch s.n., Aug. 1904 (B, L); id., alang field, Versteeg 1918, Oct. 1907 (B); Territory of New Guinea, mouth of Markham River, Weinland 200 (BD, mixed with *Ipomoea gracilis* R. Br.; L); Papua, Laloki river, open places, c. 150 ft., Carr 12936, Aug. 1935 (L); road to Rouna, wayside, c. 250 ft., Carr 12319, May 1935 (L).

Philippine Islands, according to Merrill common in thickets at low altitudes. Luzon: Cagayan, Ilocos Norte, Ilocos Sur, Abra, Union, Nueva Vizcaya, Pangasinan, Bataan, Rizal, Laguna; Mindoro; Mindanao: Lanao, Cotabato. Luzon, without precise locality, Cuming 615 (BD, K); Central Luzon, Loher 4125 (K); id., Loher 4128 (BD, K); id., Loher 4129 (K); id., San Francisco del Monte, Loher 4126 and 4127, Dec. 1893 and Febr. 1891 (K); Prov. Ilocos Norte, Bangui, Ramos, Bur. of Sc. 27606, Febr.-March 1917 (B); Cagayan Prov., Bacani, For. Bur. 16477, Jan. 1909 (BD); Prov. of Union, Bauang, Elmer 5577, Febr. 1904 (BD, K); Prov. of Nueva Vizcaya, vic. of Dupax, McGregor, Bur. of Sc. 11439, March-Apr. 1912 (BD, K, L, P); Prov. of Pampanga, Arayat, Merrill 1440, March 1903 (BD); Prov. of Bataan, Mt. Mariveles, Lamao River, Williams 353, Dec. 1903 (K); id., id., Meyer, For. Bur. 2502, Jan. 1905 (B, BD, K); id., id., Borden, For. Bur. 2714, Febr. 1905 (B, BD, K); Prov. of Rizal, Manila, Gaudichaud 187 (also numbered ? 181?) and 188 (on one sheet), Nov. 1836 (P, mixed with *Merremia hirta* (L.) Merrill); id., id., Vidal 476 (K); id., id., Merrill 644, Jan. 1903 (BD, K, S); id., Pateros, Merrill 298, Dec. 1909 (U); Prov. of Laguna, Mabesa, For. Bur. 26757, Febr.-Apr. 1917 (S); id., Los Baños, without collector's name, 2774, Jan. 1914 (S); id., Los Baños, Mt. Maquiling, Elmer 18477, June-July 1917 (B, BD, K, L, U); Mindanao, Lake Lanao, Camp Keithley, Mrs. Clemens s.n., Jan. 1907 (BD).

Distribution: S.E. Asia, Malay Archipelago, Philippines, New Guinea and trop. Australia.

Vernacular names: lawattan (Sund., Miquel); tatapajan (Sund., Hallier); lamatan, lawatan, rawatan (Jav., Koorders); lawatan koening (Koorders); sampar kidang (Jav., Koorders); indjèn indjèn (Jav., Koorders); tjoejigan (Backer); keritang tikoes (Koetai, Borneo, Endert); wale-in-sengit, amoet peror (Celebes: Tontemboan language, Koorders); katama (Celebes: Tooelooer language, erroneously, according to Koorders); beloka (Celebes, Lagi-lagi, Rachmat); djonge djonge (Celebes, Parampe, Rachmat); bangbañgau, marakamóte (Philipp.: Iloco language, Merrill); kamokamotíhan (Philipp.: Pangasinán language, Merrill); talanuk (Philipp.: Tagálog language, Merrill).

Remarks: Some specimens differ from typical ones by the possession of a few small tubercles on the petiole, just as they are found in *M. hederacea* (BURM. f.) HALL. f.

JAVA, Buitenzorg, Buitenzorg, cultivated in the Botanic Garden n. XV. KB. XIII. 4 (B); Malang, Bangil, VAN STEENIS 7216, June 1935 (B, mixed with *M. emarginata* (BURM.f.) HALL.f.).

PHILIPPINE ISLANDS, Luzon, prov. Rizal, RAMOS, Bur. of Sc. 1988, Nov. 1914 (B, BD, L, P, S).

Specimens collected by BRASS in Papua have remarkably large corollas; in the specimen BRASS 7578 (L) they have a length of 3—3.5 cm:

var. **splendens** VAN OOSTSTR., nov. var.

Differt corollis majoribus ad 3—3.5 cm longis.

NEW GUINEA, Papua, Lake Daviumbu, Middle Fly River, in savannahs, on grass and borders of undergrowth of rain forest, BRASS 7578, Aug. 1936 (L, *type*). Presumably the following specimens also belong here: Lake Daviumbu, Middle Fly River, rain forest, common on lake-shores and river-banks, BRASS 7646, Sept. 1936 (L); id., common on river-banks and in reed swamps, BRASS 7778, Sept. 1936 (L).

Distribution: New Guinea.

2. **Merremia hederacea** (BURM. f.) HALL. f. in ENGL., Bot. Jahrb. XVIII (1894) p. 118; id., in Versl. 's Lands Pl.t. 1895 (1896) p. 126; KOORDERS, Exk. fl. Java III (1912) p. 112; BOLD., Zakfl. Java (1916) n. 837; MERRILL in Philipp. Journ. Sc. XIX (1921) p. 374; id. in Journ. Roy. As. Soc. Str. Br., Spec. Numb. (1921) p. 508; id., Enum. Philipp. Fl. Pl. III (1923) p. 361; id. in Univ. Calif. Publ. Bot. 15 (1929) p. 260 — *Evolvulus hederaceus* BURM. f., Fl. Ind. (1768) p. 77, t. 30, fig. 2 — *Convolvulus acetosellaefolius* DESR. in LAMK., Encycl. III (1789) p. 564 — *C. dentatus* VAHL, Symb. Bot. III (1794) p. 25; WALL., Cat. (1828) n. 1349; ROXB., Fl. Ind. I (1832) p. 477 (*C. dentatus* WILLD.) — *C. flavus* WILLD., Spec. Pl. I (1797) p. 852 — *Merremia convolvulacea* DENNST., Schlüss. Hort. Mal. (1818) p. 12, 23, 34, nomen nudum; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 114; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 305; RIDLEY, Fl. Malay Penins. II (1923) p. 458; HENDERSON in Gard. Bull. Str. Settlem. IV (1928) p. 293 — *Ipomoea chryseides* KER-GAWL. in Bot. Reg. (1818) t. 270; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 469; WIGHT, Icon. I (1840) t. 157 (*I. chrysoides*); SPANOGHE in Linnaea XV (1841) p. 339; CHOISY in DC., Prodr. IX (1845) p. 382; ZOLL., Syst. Verz. 2. Heft (1854) p. 129 (*I. chrysoides*); MIQ., Fl. Ned. Ind. II (1857) p. 616; BENTH., Fl. Austr. IV (1869) p. 423; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 206; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc.

Philipp. (1886) p. 196; v. MUELLER, Descr. Notes Pap. Pl. IX (1890) p. 64; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 219; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1064; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 254 — *I. dentata* WILLD. ex R. et S., Syst. IV (1819) p. 789 — *Convolvulus chryseides* (KER.-GAWL.) SPRENG., Syst. I (1825) p. 598 — *C. lapathifolius* SPRENG., Syst. I (1825) p. 604 — *Lepistemon muricatum* SPANOGHE in Linnaea XV (1841) p. 339 — *Ipomoea zebrina* PERR. ex CHOISY in DC., Prodr. IX (1845) p. 382 — *I. acetosellaefolia* (DESR.) CHOISY in DC., Prodr. IX (1845) p. 383; MIQ., Fl. Ned. Ind. II (1857) p. 618 — *I. subtriflora* ZOLL. et MOR. in MOR., Syst. Verz. ZOLL. (1846) p. 51 — *Merremia chryseides* (KER-GAWL.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; COOKE, Fl. Bomb. II (1905) p. 238; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 109; GAMBLE, Fl. Pres. Madras V (1923) p. 929. Fig. 1, e—f, m—n.

Herb with twining or prostrate stems, the prostrate ones rooting at the nodes or sometimes at the internodes, to 2 mm thick, mostly thinner, slender, terete, finely striate, smooth or sparsely and minutely tuberculate, glabrous or sparsely hirsute especially at and above the nodes. Leaves ovate in outline, the margin entire or crenate to obscurely or deeply 3-lobed, in the latter case the middle lobe mostly contracted at the base, the lateral lobes broadly rounded, entire or crenate; the apex of the leaf mostly obtuse, mucronulate, the base broadly cordate; surfaces glabrous or sparsely hairy; length 1.5—5 cm, breadth 1.2—4 cm; petiole slender, 0.5—6 cm, with a few small tubercles, especially in the basal half. Inflorescences axillary; peduncles thicker than the petioles, shorter than or exceeding the leaves, 1—10 cm long, terete at their base, often angular at the top, mostly glabrous, smooth or occasionally minutely tuberculate; flowers 1 or few to several, in the latter cases the primary ramification dichasial with a terminal flower, the sequent ramifications often monochasial; bracts narrow-obovate, mucronulate, 3 mm long, deciduous; pedicels 2—4 mm long, smooth or minutely tuberculate. Flower-buds oblong to broad-elliptic, obtuse. Sepals concave, broadly obovate to spathulate, broadly notched at the apex, distinctly mucronulate, mucro directed outward, "giving the cyme a squarrose aspect" (BENTHAM, Fl. Austr. l.c.), quite glabrous or occasionally with a few hairs on the back and along the margins; two outer sepals 3.5—4 mm long, inner ones to 5 mm long. Corolla yellow, campanulate, 6—10 mm long, with 5 distinctly 5-nerved midpetaline bands, glabrous outside, inside with a few long hairs near the base of the filaments. Filaments inserted near the corolla base, filiform, slightly

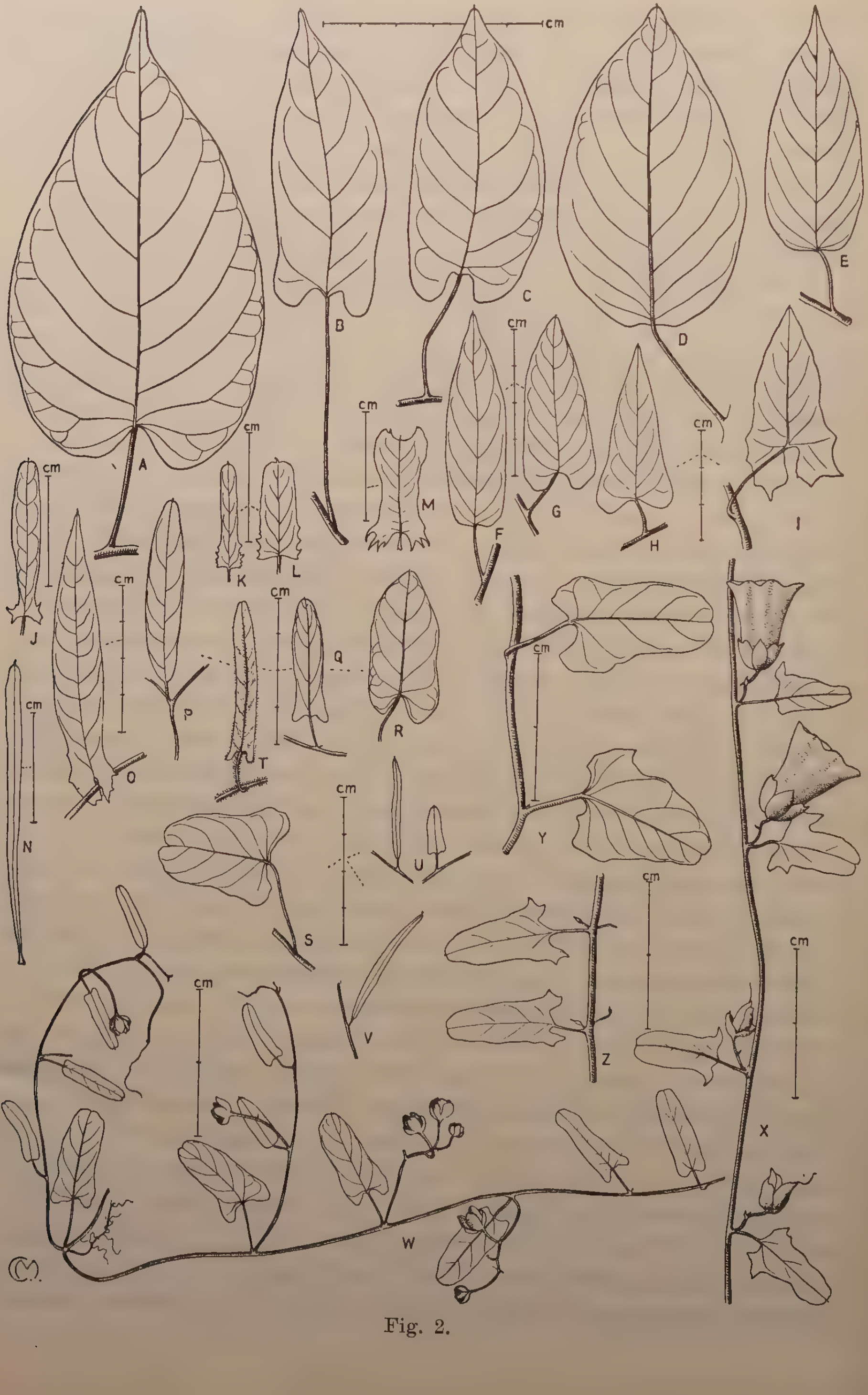

Fig. 2.

dilated and long hairy at the base, 6—8.5 mm long. Ovary broadly conical, glabrous; style filiform, about 9 mm long; stigma biglobular, papillose. Capsule broadly conical to depressed-globular, somewhat 4-angular, about 5—6 mm high, 4-valved, the valves transversely or reticulately wrinkled, less coarsely than in *M. gemella.* Seeds mostly 4, short-pubescent or short-pubescent and with long reddish brown or fulvous hairs at the hilum and along the margins, sometimes also on the sides (see Remarks), 2.5 mm long.

Malay Peninsula, according to Ridley, a weed of cultivation and common on sand-banks; known from Prov. Wellesley, Perak, Kelantan, Selangor, Pahang, Johor and Singapore. Kelantan, Kota Bahru, Yapp 259 (K); Gua Ninik, Henderson, Singapore Field n. 19617, Oct. 1927, *p* 1) (B, S); Channing, Ridley s.n., Febr. 1917, *p* (K); Prov. Wellesley, Prye Dock, Curtis 2210, Jan. 1890 (S); Perak, Scortechini s.n., *p* (S); Ipoh, Burkill, Singapore Field n. 2784 (S); Changkat Mentri, Kloss 6481, Sept. 1918 (K); Pahang, Ridley 2168a, *p* (S); Kuala Tahan, Seimund 14, Nov. 1920 (S); Khol, Tembeling River, Ridley 2168 (S); Pahang River, Ridley s.n., Aug. 1891 (S, fasciation); Selangor, road from Kuala Lumpur, on bushes, Ridley s.n., Dec. 1920 (K); Johore, Serom, Ridley s.n. (S); Sungei Tukong Estate, Gordon Spare 1000, Jan. 1932, *p* (S); Kota Tinggi Road, Corner, Singapore Field n. 30725, Jan. 1936, *p* (S); Tanah marah road, Ridley s.n., Jan. 1890, *p* (S); between Batu Pahat and Bandar Maharam, not uncommon along ditches, Burkill and Haniff, Singapore Field n. 16369, Oct. 1924 (S); Singapore, Hullett 261, Dec. 1885, *p* (BD, S); Mayer, Schlesisch bot. Tauschverein 122, July 1895 (BD); Ridley s.n., *p* (S); Kranji, Ridley 14184, *p* (S); Jurong, Ridley 2687, Jan. 1890 (S); Bukit Tunah road, Ridley and Hullett s.n. (S).

Sumatra, without precise locality, Korthals 273, *b, type of f. barbata* (L); East Coast, Jochems 3166, Dec. 1922 (B); E. of Loeboek pakam, moist soil, c. 20 m, not common, Lörzing 3299, Oct. 1914, *p* (B, L); near Serdang, c. 8 m,

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1) *p*: f. *pubescens*; *b*: f. *barbata*.

Fig. 2, A—I: *Merremia umbellata* (L.) Merrill var. *orientalis* Hall. f., leaves; A: Soegandiredja 180 (B); B—C: Korthals 126 (L); D—E: Koorders 28093 β (B); F: Wallich 1343 (L); G: Backer 8774 (B); H: Backer 17583 (B); I: Backer 8460 (B); J—N: *Merremia tridentata* (L.) Hall. f. ssp. *genuina* (Hall. f.) van Ooststr., leaves; J: Bünnemeyer 1468 (B); K: Teysmann 3392 H. B. (B); L: Teysmann s.n. (L, 901, 163. 357); M: Thomson s.n. (L, 901, 163. 352); N: Holttum, Singapore Field n. 15249 (B); O: *Merremia tridentata* (L.) Hall. f. ssp. *hastata* (Desr.) van Ooststr., leaf, Bünnemeyer 1927 (B); P—W: *Merremia hirta* (L.) Merrill, leaves and branch; P: Reinwardt 150 (L); Q: Korthals 225 (L); R: without collector's name (L, 902, 35.162); S: Bakhuizen van den Brink 5484 (L); T: Rachmat 79 (L); U: two leaves of Merrill 762 (U); V: Weinland 349 (L); W: branch of Bakhuizen van den Brink 6366 (U); X—Z: *M. hirta* (L.) Merrill var. *retusa* van Ooststr.; X: type, Merrill 3615 (L); Y—Z: leaves of Merrill, Spec. Blanc. 679 (B, L).

LÖRZING 3386, Nov. 1914 (B); Asahan, Boenoet, YATES 1881, Nov. 1925, *p* (S); West Coast, Pariaman, TEYSMANN? s.n. (B); Padang, KORTHALS 271, *b*, (L); id., without collector's name 226, March 1870, *b* (B); Djambi, Pahoe, 30 m, POSTHUMUS 1072, Oct. 1925, *p* (B, L, S, U).

JAVA, a specimen presumably from Java, *type of Evolvulus hederaceus* BURM.f. (herb. BURMAN in herb. Genève). Without precise locality, without collector's name, 178, *b* (L); id., KORTHALS 120, *b* (L); Batavia, Tandjong Priok, 5 m s.m., BAKHUIZEN VAN DEN BRINK fil. 1442, July 1922, *p* (B); Mr. Cornelis, 20 m, BACKER 33561, July 1903 (B); Salemba, 15 m, BACKER 33560, Apr. 1903 (B); Weltevreden, 10 m, BACKER 33559, June 1902 (B); Pal Merah, S.W. of Weltevreden, 20 m, BACKER 33562, May 1903, *p* (B); Pantjoran Baroe near Tjikoja, ZOLLINGER 701, Nov. 1842, *type of Ipomoea subtriflora* ZOLL. et MOR., *p* (BD, K, L); Buitenzorg, Buitenzorg, 250 m, BAKHUIZEN VAN DEN BRINK Jr. 443, June 1920 (B); id., BAKHUIZEN VAN DEN BRINK 3835, June 1920 (L); id., BAKHUIZEN VAN DEN BRINK 6798, May 1927 (B); id., 245 m, BACKER 21372, July 1916 (B); cultivated in the Botanic Garden, TEYSMANN s.n., *p*, *type of f. pubescens* (L); id., HALLIER s.n., March 1893, *p* (L); XV. K. B. IX. 2, from Australia (B); XV. K. B. XI. 11, from Madoera (B); XV. K. B. XIII. 2 (B); XV. K. B. XIII, 10, *p* (B); XV. K. B. XIII. 12 (B); Priangan, PLOEM s.n. (L); Banjoemas, HORSFIELD (K (*p*); L, U); Soerabaja, Grissee, DORGELO 735, July 1922 (Pa); Malang, Djatiroto, 25 m, BACKER 8128, May 1913 (B). A specimen mentioned by ZOLLINGER under *Ipomoea chryseides* (n. 2881) and collected in Besoeki, near Gambiran, belongs to *Merremia hirta* (L.) MERRILL.

BORNEO, W. division, Poeloe Madjang, TEYSMANN 8293 (B); S. and E. division, Bandjermasin, MOTLEY 233 (K); Sarawak, Baram district, Baram, HOSE 290, Nov. 1894 (K); British North Borneo, AGAMA 465, Sept.-Dec. 1917, *p* (B); Sandakan, Myburgh Prov., in burned-over areas, near roads, ELMER 20329, Oct.-Dec. 1921 (B, BD, K, L, S, U).

CELEBES, Celebes and Dependencies, Pangkadjene, Tjampeang, TEYSMANN 12251, *p* (B, L).

TIMOR, without collector's name, 194, named *Lepistemon muricatum* SPAN. (L).

MOLUCCAS, Ternate, c. 20 m, BEGUIN 1610, May 1921, *p* (B, L); Batjan, BOERLAGE 567, Aug. 1900, *p* (B).

NEW GUINEA, Dutch New Guinea, Naumoni, Omeri, 150 m, MOSZKOWSKI 369, Oct. 1910, *p* (BD); Territory of New Guinea, SCHLECHTER 17548, Apr. 1908 (BD); Papua, Fly River, D'ALBERTIS (according to VON MUELLER, 1890); Fly River, Oroville Camp, 30 miles above d'Albertis Junction, massed on low rainforest second growths, BRASS 7443, Aug. 1936, *b* (L).

PHILIPPINE ISLANDS, according to MERRILL, in thickets and in open grasslands at low altitudes. Luzon: Union, Pampanga, Rizal, Laguna; Masbate; Mindanao; Zamboanga. Without precise locality, CUMING 618 (BD); Luzon, CUMING 617 (BD, K); Pangasinan Prov., RAMOS, Bur. of Sc. 4835, Dec. 1907, *p* (S); id., Alaminos, MCGREGOR, Bur. of Sc. 41406, Dec. 1922 (B, BD, L); Rizal Prov., RAMOS, Bur. of Sc. 24088, Dec. 1915 (L); id., Manila, MERRILL 3419, Oct.-Nov. 1903 (BD, K); Masbate, MERRILL 3398, Nov. 1903, *p* (BD, K, L); Cebu, RAMOS, Bur. of Sc. 11041, March 1912 (L).

Distribution: Tropical Africa, Mascarene Islands; tropical

Asia from the Himalaya southwards to Ceylon and eastwards to Burma, China, the Malay Peninsula and Archipelago; N. Australia (Queensland).

Vernacular names: ramijo (Djambi, POSTHUMUS); aroj djotong gede (Sund., KOORDERS); tatapajan (Sund., Batavia, HALLIER); lawatan (E. Java, KOORDERS); rabassa (Java, BURMAN); kĕlĕmibiet (Borneo, W. division, Poeloe Madjang, TEYSMANN).

Remarks. On account of the pubescence of the seeds one can distinguish two forms:

1. a form with the seeds shortly pubescent or nearly glabrous over the whole surface or with only some slightly longer reddish brown hairs at the hilum and at the margins:

f. **pubescens** n.f. (Fig. 1, m), seminibus pubescentibus vel subglabris, hilo et interdum marginibus pilis nonnullis sublongioribus praeditis.

Type: TEYSMANN s.n., a specimen cultivated in the Botanic Garden at Buitenzorg (L).

2. a form with the seeds shortly pubescent, the hilum and the margins with long hairs, sometimes the long hairs also on the sides.

f. **barbata** n.f. (Fig. 1, n), seminibus pubescentibus, hilo et marginibus barbatis.

Type: KORTHALS 273, Sumatra (L).

As far as the specimens mentioned under the species are in possession of ripe seeds, they are marked *p* or *b*, respectively indicating f. *pubescens* and f. *barbata.* As the type specimen of BURMAN in Genève has no ripe seeds, it is impossible to decide to which of these two forms it belongs.

3. **Merremia hirta** (L.) MERRILL in Philipp. Journ. Sc. VII (1912) Bot. p. 244; id., Spec. Blanc. in Philipp. Bur. of Sc. Publ. 12 (1918) p. 324 (see var. *retusa*); id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508; id., Enum. Philipp. Fl. Pl. III (1923) p. 361; id. in Philipp. Journ. Sc. LIX (1936) p. 452, pl. 1 [1]) — *Convolvulus reptans* L., Spec. Plant. ed. 1 (1753) p. 158, excl. syn. Rheed.; HALL. f. in Meded. Rijksherb. 1 (1910) p. 21; id., ed. 2 (1923) p. 20; MERRILL in Philipp. Journ. Sc. LIX (1936) p. 451—452, pl. 1 — *C. hirtus* L., Spec. Plant. ed. 1 (1753) p. 159; HALL. f. in Meded. Rijksherb. 1 (1910) p. 21; id., ed. 2 (1923) p. 20 — *C. caespitosus* ROXB., Fl. Ind. II (1824) p. 70 (not seen); WALL., Cat. (1828) n. 1357 (*C. cespitosus*); ROXB., Fl. Ind. I (1832) p. 483 (*C. cespetosus*) — *Ipomoea linifolia* BL., Bijdr.

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[1]) With important critical notes on the identity of *Convolvulus reptans* L.

(1825) p. 721; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 474; id. in DC., Prodr. IX (1845) p. 369; MIQ., Fl. Ned. Ind. II (1857) p. 604; id., Suppl. (1860) p. 235, 561; BENTH., Fl. Austr. IV (1869) p. 423; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 205; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 412; SCHUM.-LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 517; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1064; id., Compreh. Cat. Queensl. Pl. (1909) p. 349; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 262 — *Convolvulus Benthamii* WALL., Cat. (1828) n. 1393 — *Ipomoea philippinensis* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 475; id. in DC., Prodr. IX (1845) p. 367; MIQ., Fl. Ned. Ind. II (1857) p. 611; F.-VILL., Novis App. (1880) p. 141 (not seen) — *Skinneria caespitosa* (ROXB.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 487, t. 6; id. in DC., Prodr. IX (1845) p. 435; ZOLL., Syst. Verz. 2. Heft (1854) p. 130 (*S. caespilosa*); MIQ., Fl. Ned. Ind. II (1857) p. 621 — *Convolvulus pratensis* BUCH.-HAM. ex CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 487, in syn. — *C. linifolius* (BL.) DIETR., Syn. Pl. I (1839) p. 675, not of L., WALL. — *Hewittia caespitosa* (ROXB.) STEUD., Nom. ed. 2, I (1840) p. 757 — *Convolvulus hibridus* ZOLL. et MOR. in Nat. en Geneesk. Arch. Nederl. Ind. II (1845) p. 6; ZOLL. in Flora XXX (1847) p. 597 — *Ipomoea setulosa* ZOLL. et MOR. in MOR., Syst. Verz. (1846) p. 51 — *I. caespitosa* (ROXB.) O. K., Rev. gen. II (1891) p. 443 — *Merremia caespitosa* (ROXB.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in Versl. 's Lands Pl.t. 1895 (1896) p. 132; id. in Bull. Herb. Boiss. V (1897) p. 382; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 304; HALL. f. in Meded. Rijksherb. 1 (1910) p. 21; id., ed. 2 (1923) p. 20; KOORDERS, Exk. fl. Java III (1912) p. 112; HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 378; KOORD.-SCHUM., Syst. Verz. (1910—13) Conv. p. 2; BOLD., Zakfl. Java (1916) n. 837; RIDLEY, Fl. Malay Penins. II (1923) p. 458; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 518 — *Hewittia linifolia* Ind. Kew. (1895) p. 600, under *Convolvulus caespitosus* ROXB. Fig. 1, k; fig. 2, P—W.

An annual or biennial herb (CLARKE, PRAIN) with prostrate or twining, slender, filiform, terete, sparsely patently hirsute or glabrous stems, 20—50 cm long (BACKER), the prostrate ones rooting at the nodes and sometimes at the internodes. Leaves rather remote, shortly petioled; petiole (1—)3—8(—20) mm long, hairy above; leafblade very variable in form, linear, linear-oblong, oblong-lanceolate or oblong to ovate-oblong or ovate, occasionally orbicular to subquadrate, the narrow leaves 3—

6 cm long and 0.3—0.9 cm broad, 5—12 times as long as broad, the broad ones 1.5—4.5 cm long and 0.8—2.5 cm broad, 1—5 times as long as broad, in some specimens strikingly resembling those of *Convolvulus arvensis*, the apex obtuse to slightly emarginate and mucronulate, the base rounded, truncate, more or less cordate or hastate with small or large, obtuse, spreading or parallel auricles; the surfaces glabrous or with a few hairs beneath and along the margins, sometimes also above, in some specimens the indument is much more developed, especially on the stems, the petioles, the leafblades and the basal part of the peduncles. Inflorescences axillary, 1—few-flowered, mostly to 4-flowered, in some specimens to 8; the ramifications monochasial (racemelike and unilateral), or the first ramification dichasial and the following ones monochasial (racemelike and unilateral); peduncles glabrous or with some hairs near the base, filiform, terete, variable in length, 1—7.5 cm long; bracts small, 1—2 mm long, ovate, obtuse, glabrous, persistent; pedicels glabrous, 3—5 mm long. Flower-buds oblong to elliptic, obtuse. Sepals glabrous, unequal, the 2 outer shorter, elliptic, obtuse, 3—4 mm long, the 3 inner longer, oblong or elliptic oblong, 4.5—6 mm long, the margins when dry often inflexed above; sepals slightly enlarged in fruit, to 6 or 7 mm long, with more or less prominent nerves. Corolla pale-yellow or whitish, broadly funnel-shaped, glabrous, 1.5—2 cm long, the midpetaline bands in dried state with distinct dark nerves. Filaments dilated and hairy at the base, 5.5 mm long, the anthers spirally twisted. Ovary glabrous, conical, 2-celled; style filiform, glabrous, 8 mm long. Capsule broad-ovoid to globular, with a thin papery wall, smooth, glabrous, 1-celled, crowned by the base of the style, about 6 mm long, 4-valved, the valves nerved; seeds 4 or less, dark-brown or black, glabrous or sparsely floccose at the margins and at the hilum.

MALAY PENINSULA, according to PRAIN, 1906 and RIDLEY, 1923 in Perlis, prov. Wellesley, Perak, Pahang, Malacca and Singapore, "common in grass". Perlis, Gua Nangka, HENDERSON, Singapore Field n. 23065, Nov. 1929 (S); Prov. Wellesley, Muda River, Dusun Gajah, BURKILL, Singapore Field n. 3082, Jan. 1918 (S); Permatang Bertam, RIDLEY s.n., Dec. 1895 (S); Penang, cult. in the Botanic Gardens, MD NUR s.n., May 1919 (S); Perak, Ipoh, BURKILL, Singapore Field n. 2787, Nov. 1917 (S); Tringganu, ROSTADOS s.n., Febr. 1890 (S); Pahang, Katapang, Pekan, RIDLEY s.n., May 1890 (S); Telok Sisik, Kuantan, BURKILL and HANIFF, Singapore Field n. 17324, Dec. 1924 (S); Selangor, Salak, South road, coll. ?, Jan. 1921 (K); Singapore, HULLETT 112, March 1884 (S); HULLETT 263, Nov. 1885 (S); RIDLEY s.n. (S, fasciation); CANTLEY s.n. (S, fasciation); Kranji, GOODENOUGH s.n., Dec. 1889 (S); Chan Chu Kang, RIDLEY 2686, Nov. 1889 (S).

SUMATRA, Tapanoeli, Middle Habinsaran, between Sibosor and Parsoboeran, waste places, rare, c. 1100 m, LÖRZING 7761, Nov. 1920 (B); West Coast, Padanglawas, HORNER s.n. (L); Fort van der Capellen, MATTHEW s.n., Jan. 1913 (K); Bangka, AMAND s.n. (K, L, U).

JAVA, according to BACKER in West and Middle (but also in East, *the author*) Java, in the lower parts, in damp grasslands. Without precise locality, HORSFIELD Conv. 1 (K); id., JUNGHUHN? s.n. (L); id., REINWARDT 150 (L); id., ZIPPELIUS? 197 (L); id., Tjilendeh?, RAAP 344, June 1894 (L); id., Tjikaret Oedik, RAAP 445, June 1894 (L); Bantam, Bodjangmanik, waysides, common, KOORDERS 41514 β, June 1912 (B); Rangkasbitoeng, common in grass, 50 m, BACKER 1029, June 1911 (B); Sadjira, wayside, common, c. 150 m, BACKER 2067, June 1911 (B); Batavia, Weltevreden, BACKER 35451, June 1903 (B); id., BACKER 35452 (B); Bidaratjina, EDELING? s.n. (B); Kandangsapi, KORTHALS 225 (L); Poerwakarta, grassy places, waysides, common, 60—150 m, BACKER 13766, June 1914 (B); Buitenzorg, Buitenzorg, grassland, 240 m, BAKHUIZEN VAN DEN BRINK fil. 1505, July 1922 (B, L); id., rice fields, HALLIER 207a, Apr. 1893 (B); id., cultivated in the Botanic Garden, HALLIER C. 161a, May 1895 (L); behind Tjiwaringin, HALLIER 207c, Apr. 1893 (B); near Waroeng mangga, HALLIER 207b, May 1893 (B); Bodjong Ejot, rather common in grassland and dry rice fields, 200 m, BAKHUIZEN VAN DEN BRINK 6366, June 1924 (B, L, U); Depok, c. 90 m, BAKHUIZEN VAN DEN BRINK 5484, May 1922 (B, L); Soekaradja, wayside, common, 250 m, BAKHUIZEN VAN DEN BRINK 3800, July 1920 (B); Koeripan, dike of rice field, VAN STEENIS 4490, July 1930 (B); near Tjibaroesa, grassy places, dikes of rice fields, waysides, frequent, c. 100 m, VAN STEENIS 5285, May 1933 (B); Tjibodas, Tjinaroea, RAAP 832, July 1894 (L); Palaboehanratoe, BOERLAGE s.n., July 1888 (L); Tjidaoen near Palaboehan, beach, KOORDERS 34665 β, Apr. 1899 (B); Babakan, LEHMANN s.n. (BD); Cheribon, Alaëta, 15 km NNW. of Kadipaten, VAN HARREVELD s.n., July 1923 (Pa); Semarang, Kedoengdjati, KOORDERS 28462 β, June 1897 (B, L); Soerabaja, Wonokromo, DORGELO 762bis, July 1924 (Pa); Besoeki, Djember, ULTÉE 3 (B); Moemboel, ZOLLINGER 1450, *type of Convolvulus hybridus* ZOLL. et MOR. *and of Ipomoea setulosa* ZOLL. et MOR. (BD) (according to ZOLLINGER also collected near Tjoeroek (Tjoeroeg?, Batavia); near Gambiran, ZOLLINGER 2881 (BD); Madoera, Pamekasan, Tambhoeng, Adjunct advisory agricultural expert of Pamekasan 20, June 1934 (B); Kangean-islands, Kangean, S.E. Ardjasa, moist grasslands, frequent, 50 m, BACKER 30033, May 1919 (B).

BORNEO, S. and E. division, Bandjermasin, MOTLEY 892 (K); Hayoep, June 1908, WINKLER 2275 (BD); British North Borneo, Labuan, HULLETT 387, Nov. 1884 (K); id., MERRILL c, Nov. 1902 (S); according to MERRILL 1921, collected in Sarawak: Native collector, Bur. of Sc. 1975.

CELEBES, Bili-bili, RACHMAT 79, exp. VAN VUUREN, June 1913 (B, L); Lasao, along field, 100 m, KJELLBERG 1174, Apr. 1929 (B); Celebes and Dependencies, Bonto Parang, wayside, 50 m, BÜNNEMEYER 10692, March 1921 (B).

MOLUCCAS, Amboina, REINWARDT 51 (L); id., without collector's name, 294, named *Ipomoea linifolia* BL. in BLUME's handwriting (L); id., id. 1392 (L); id., id. 34/d (L); Soja di bawa, TREUB 562 (B, mixed with *Merremia tridentata* (L.) HALL.f. ssp. *hastata* (DESR.) VAN OOSTSTR.); Karang Pandjang, RANT 231, June 1929 (B, mixed with *Merremia tridentata* (L.) HALL.f. ssp. *hastata* (DESR.) VAN OOSTSTR.); Waai, beach, RANT 766, Nov. 1931 (B); Ceram, W. Ceram, W. of Piroe, alang fields, RUTTEN 1692, Sept. 1918 (B, L); Boano island, KORNASSI 1306, May 1918 (B).

NEW GUINEA, Territory of New Guinea, Finschhafen, WARBURG (according to WARBURG, 1891); Matatakum, grasslands, WEINLAND 349, Oct. 1890 (B, BD, L, S); near Constantinhafen, SCHLECHTER 14276, March 1902 (BD); Flachsee, 30—40 m, LEDERMANN 7004, Apr. 1912 (BD); Papua, Kanosia, in open savannah land, c. 50 ft, CARR 11756, Apr. 1935 (BD, L); Lake Daviumbu, Middle Fly River, savannahs, abundant in grass on shores of swamps, BRASS 7543, Aug. 1936 (L); id., occasional on wet grass plains and low savannahs, BRASS 7836, Sept. 1936 (L.).

BISMARCK ARCHIPELAGO, New Ireland, Namatanai, Nukonuko, alang field, PEEKEL 364, March 1910 (BD).

PHILIPPINE ISLANDS, according to MERRILL in open grasslands, at low altitudes; Luzon: Cagayan, Lepanto, Pangasinan, Tarlac, Bulacan, Rizal; Culion; Guimaras; Cebu; Mindanao: Lanao, Davao. Luzon, Prov. of Cagayan, RAMOS, Bur. of Sc. 14578, Febr. 1912 (L); Zambales Prov., Anuling, RAMOS and EDAÑO, Bur. of Sc. 44610, Nov.-Dec. 1924 (B, K); Rizal Prov., Manila, GAUDICHAUD 187 (? 181?) and 188, Nov. 1836 (P, mixed with *Merremia gemella* (BURM.f.) HALL.f.); id., LOHER 4161 (K); id., Novaliches, in grass, LOHER 4159, Nov. 1890 (K); id., MERRILL, Bur. of Sc. 762, Nov. 1910 (U); Culion, open damp soil, MERRILL 475, Dec. 1902 (BD); Mindanao, Distr. of Davao, Davao, COPELAND 597, March 1904 (K).

Distribution: India to Southern China, Malaysia and tropical Australia.

Vernacular name: rebbha teng-ketteng (Madoera).

var. **retusa** VAN OOSTSTR., nov. var. Fig. 2, X—Z.

Differt sepalis interioribus 3 latioribus late ellipticis vel subquadratis, apice truncatis vel retusis mucronulatis, sepalis exterioribus ellipticis obtusis vel acutiusculis mucronulatis. Folia oblonga, 0.8—2.5 cm longa, apice obtusa vel subretusa mucronulata, basi hastata, lobis integris vel 1—2-dentatis. Pedunculi breves, ad 1 cm longi, 1- vel interdum 2—3-flori.

PHILIPPINE ISLANDS, Luzon, Prov. Benguet, Cervantes, LOHER 4160 (K); Prov. Zambales, LOHER 6687, Febr. 1906 (BD, K); Prov. Tarlac, Conception, MERRILL 3615, Nov. 1903 (BD, K; L, *type*); Prov. Bulacan, Angat, MERRILL, Spec. Blanc. 679, Dec. 1914 (B, BD, K, L); Prov. Rizal, Antipolo, VIDAL 3347, March 1886 (K); Manila, VIDAL 3346, March 1886 (K).

Distribution: Philippine Islands.

Remarks. The specimen MERRILL, Spec. Blanc. 679 was distributed by that author as an illustrative specimen of BLANCO's *Ipomoea hepaticifolia* (BLANCO, Fl. Filip. ed. 2 (1845) p. 72 (not seen); id., ed. 3 (1877) p. 134, non L.). See MERRILL, Spec. Blanc. (1918) p. 324. On account of the short, incomplete description of BLANCO it is, however, impossible to verify MERRILL's opinion.

4. Merremia dichotoma VAN OOSTSTR., nov. spec. Fig. 1, b—c.

Frutex scandens, ramis gracilibus ad 2 mm diam., teretibus, leviter striatis, griseo-brunneis, minute verrucosis, parce hirsutis, glabrescentibus vel glabris; foliis petiolatis, petiolo glabro vel apicem versus pilis non-

nullis praedito, 1.5—2.5 cm longo, ovatis, 4—7 cm longis, 2.5—3.5 cm latis, glabris, integris, apicem versus gradatim attenuatis, apice obtusis mucronulatis, basi cordatis, auriculis rotundatis; nervis lateralibus utrinque 8—10; inflorescentiis axillaribus, glabris, 6—15 cm longis, pedunculis teretibus laevibus, 4—7 cm longis, apice plerumque simpliciter, interdum duplo raro triplo dichasialiter ramosis, ramis ultimis monochasialibus, ramis omnibus bracteas persistentes oblongas vel ovatas, concavas, 2—4 mm longas, gerentibus, pedicellis 5—6, demum ad 8—9 mm longis; alabastris obtusiusculis, sepalis glabris, inaequilongis, exterioribus 2 brevioribus, 4 mm longis, oblongis vel oblongo-ellipticis, obtusis, minutissime mucronatis, interioribus 6 mm longis, late ovatis vel orbicularibus, obtusis vel subretusis; corolla alba, late infundibuliforme, fasciis 5 distincte 5-nervosis praedita, glabra, circ. 18 mm longa, intus sub basi omnium filamentorum duas series pilorum gerente; filamentis circ. 2.5 mm supra basin corollae insertis, circ. 10 mm longis, parte inferiore valde dilatata, 2 mm longa, pilosa, apice elongata, incurvata, squamiforme; ovario globoso, glabro, stylo filiforme, 13 mm longo, stigmatibus globosis; capsula subglobosa, mucronata, circ. 7 mm alta, 4-valvata, valvis reticulato-rugosis, 2-loculata, seminibus 2 in loculo, circ. 3.5 mm longis, nigris, opacis, parce pubescentibus, marginibus villosis.

TIMOR, South Middle Timor, Kolbano, S. coast, not frequent, WALSH 375, April 1929 (B, *type*).

Distribution: Timor.

Vernacular name: knâtan.

5. **Merremia emarginata** (BURM. f.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 118; id. in Versl. 's Lands Pl.t. 1895 (1896) p. 132; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; COOKE, Fl. Bombay II (1905) p. 236; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 113; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 109; KOORDERS, Exk. fl. Java III (1912) p. 113; BOLD., Zakfl. Java (1916) n. 835; MERRILL, Spec. Blanc. in Philipp. Bur. of Sc. Publ. 12 (1918) p. 324; id. in Philipp. Journ. Sc. XIX (1921) p. 374; GAMBLE, Fl. Pres. Madras V (1923) p. 928; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 360; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1299; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 518 — *Evolvulus emarginatus* BURM. f., Fl. Ind. (1768) p. 77, t. 30, fig. 1 — *Convolvulus reniformis* ROXB., Fl. Ind. II (1824) p. 67 (not seen); WALL., Cat. (1828) n. 1398; ROXB., Fl. Ind. I (1832) p. 481; BLANCO, Fl. Filip. (1837) p. 91; id., ed. 2 (1845) p. 67 (not seen); id., ed. 3, I (1877) p. 126 — *Ipomoea reniformis* (ROXB.) CHOISY

in Mém. Soc. Phys. Genève VI (1833) p. 446; id. in DC., Prodr. IX (1845) p. 351 (excl. syn. L.); Zoll., Syst. Verz., 2. Heft (1854) p. 128; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 206; Rolfe in Journ. Bot. XXIII (1885) p. 214; Forbes, Wander., Germ. ed. II (1886) p. 222; Vidal y Soler, Rev. Plant. Vasc. Philipp. (1886) p. 196; Watt, Dict. Econ. Prod. India IV (1890) p. 491; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 106; Trimen, Handb. Fl. Ceyl. III (1895) p. 218 — *Convolvulus excisus* Zipp. in Linnaea XV (1841) p. 338, in syn. — *Ipomoea cymbalaria* Fenzl. in Flora XXVII (1844) p. 312, nomen — *Lepistemon reniformis* (Roxb.) Hassk., Pl. Jav. Rar. (1848) p. 524; Miq., Fl. Ned. Ind. II (1857) p. 629; F.-Vill., Novis App. (1880) p. 142 (not seen). Boerlage gives the name *Lepostemus reniformis* as a synonym under *Merremia emarginata* — *Evolvulus Glechoma* Welw., Apont. Phytogeogr. Angola (1859) p. 589 — *Ipomoea emarginata* (Burm. f.) O. K., Rev. Gen. (1891) p. 444.

A perennial herb, the stems prostrate and rooting at the nodes, terete or subangular, branched, sparsely hairy and glabrescent, the older parts sometimes warty, 30—75 cm long (Backer). Leaves kidney-shaped to broad-ovate, coarsely crenate or entire, the apex obtuse to broadly rounded or slightly emarginate, the base cordate with broadly rounded sinus, the auricles rounded; surfaces glabrous or sparsely appressed pilose; length 0.5—2.5 (—3.5) cm, width 0.6—2.5 (—3.5) cm; petiole about as long as the blade or shorter, terete, sulcate above, short-hairy or minutely verrucose, 0.2—2(—3.75) cm long. Flowers axillary, solitary or in 2—3-flowered cymose clusters; peduncle very short or nearly absent; pedicels short, 2—4 mm; bracts small, ovate to linear, acute, hairy. Flower-buds globular, obtuse. Sepals obovate to orbicular or subquadrate, the outer ones obtuse with cucullate and distinctly mucronate top, the inner ones deeply emarginate, all long ciliate at the margin and more or less hairy on the back, the outer ones 2.5—3 mm, the inner ones 3—4(—6) mm long. Corolla tubular-campanulate, glabrous, 5—9 mm long, slightly 5-lobed at the margin, yellow with paler base and with 5 distinct, 5-nerved midpetaline bands, these bands suffused purple outside; corolla hairy inside at the base of the filaments. Ovary conical, glabrous; style filiform, glabrous, c. 4 mm; filaments hairy at their base, c. 4.5 mm long, inserted near the base of the corolla; disk low, yellow. Capsule black (Hallier), subglobose, 5—6 mm in diam., longitudinally sulcate, glabrous, crowned by the thickened, smooth base of the style; the capsule at its base enclosed by the sepals; seeds 4 or less, greyish-brown, glabrous, dotted, c. 2.5 mm long.

Java, from W. to E. Java, in the lower parts with rather strong to very strong east monsoon, on rather heavy soil, on fields and grasslands, locally frequent. Without precise locality, Teysmann s.n. (B); id., Zollinger s.n. (U); Batavia, Chinese churchyard, N. of Weltevreden, Hallier s.n., Aug. 1896 (B); Batavia, Vorderman s.n. (B); Pegansaän, Backer 34326, May 1903 (B); Weltevreden, Koningsplein, Koorders 32604 β, July 1898 (B); Meester Cornelis, Backer 34327, July 1903 (B); Poerwakarta, 75 m, Backer 13876, June 1914 (B); Tjikoempaj, E. of Poerwakarta, c. 110 m, Harmsen 72, Dec. 1921 (B); Buitenzorg, cultivated in the Botanic Garden, XV. K. B. XII. 8 (B); Cheribon, forestry Indramajoe, along railroad, 20—30 m, van Steenis 6752, March 1935 (B); Pekalongan, Tegal, 1 m s.m., sandy soil behind beach, Backer 15258, Aug. 1914 (B); between Slawi and Balapoelang, 50—100 m, Backer 15384, Sept. 1914 (B); Banjoemas, Kawoeng anten near Maos, 25 m, railroad, Backer 4642, Sept. 1912 (B); Magelang, Keboemen, 25 m, Brinkman 353 (B); Semarang, Sugar factory Rendeng, without collector's name and number (Pa); Djapara-Rembang, Ngandang, Sedan, 150 m, Koorders 34860 $^{\beta}$, June 1899 (B); Madioen, Kendal, dry sunny wayside, 5 m, Backer 16294, Sept. 1914 (B); Soerabaja, Soerabaja, Zippelius 195 (L); Madjakerta, van Harreveld s.n., Febr. 1915 (B); Gresik, van Slooten 2042, Sept. 1928 (B); Malang, Malang, waysides, Zollinger 2483, Nov. 1844 (B, BD); G. Semongkrong near Pasoeroean, dry fields, 20—80 m, Backer 24237, June 1918 (B); Bangil, van Steenis 7216, June 1935 (B, mixed with *Merremia gemella* (Burm.f.) Hall.f.).

Borneo, S. and E. division, Bandjermasin, Korthals 108 (L).

Timor, without precise locality, Zippelius 57/c, *type of Convolvulus excisus* Zipp. (L, U); id., Zippelius? 196 (L); id., without collector's name (BD, L, P).

Soembawa, E. Soembawa, Kapenta, wayside, 200 m, de Voogd 2555, June 1936 (B).

Philippine Islands. According to Merrill, Spec. Blanc. (1918) p. 324, the species has all the appearance of being an introduced one in the Philippines, as it occurs only in the settled areas. In dry open grasslands and waste places at low altitudes. Luzon, Prov. Pangasinan, Alaminos, Clemens 18171bis, Apr. 1928 (B, S); id., Anda Is., edge of rice field, Clemens 18172, Apr. 1928 (B); Prov. of Bataan, Limay, Robinson, Bur. of Sc. 9619, Dec. 1909 (BD, L); id., Lamao, Merrill, Spec. Blanc. 357, Nov. 1913 (B, BD, K, L, P); Rizal prov., Manila, Gaudichaud 180, Nov. 1836 (P); id., id., Gaudichaud s.n. (BD); Prov. Albay, Cuming 1030 (L).

Distribution: Tropical Africa, tropical Asia, Malaysia.

Vernacular names: emboen, pĕgagan oetan (Jav., Heyne); paschaga-oetan-kitsjil (Jav., Burman); bato-bato (Philipp., Tagálog language, Blanco), kupit-kupit (Philipp., Ilóko language, Merrill).

Use: According to Watt l.c. "the plant is described as deobstruent and diuretic (Sakharam Arjun)". Dymock remarks that the Hindus administer the juice in rat-bite, and drop it into the ear to cure sores in that organ. According to Roxburgh and to Watt the plant is used as a pot-herb.

Heyne l.c. writes: "Mrs. Kloppenburg recommends an infusion of the leaves in cases of "burning motions" and a decoction of the leaves with sugar as a cough-medicine."

Remarks. BACKER describes the stems, the leaves and the margins of the sepals as being often suffused purple. He also points out the resemblance of the vegetative parts with those of *Centella asiatica* URB. The species has been also confounded in the herbaria with *Dichondra repens* FORST.

Section 2. **Streptandra** HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1894) p. 114.

Flower-buds ovoid or conical, mostly acute; midpetaline bands of the corolla in dried state often with 5 dark lines; flowers of moderate size or large.

6. **Merremia tridentata** (L.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 116; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; COOKE, Fl. Bombay II (1905) p. 237; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 111; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 304; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 108; GAMBLE, Fl. Pres. Madras V (1923) p. 928; RIDL., Fl. Malay Penins. II (1923) p. 458 — *Convolvulus tridentatus* L., Spec. Pl. (1753) p. 157; ROXB., Fl. Ind. II (1824) p. 56; WALL., Cat. (1828) n. 1347; ROXB., Fl. Ind. I (1832) p. 475 (*C. tridentatus* WILLD.) — *Evolvulus tridentatus* (L.) L., Spec. Pl. ed. 2 (1762) p. 392; BURM. f., Fl. Ind. (1768) p. 77, t. 16, fig. 3 — *Ipomoea tridentata* (L.) ROTH in ROEM., Arch. Bot. I, 2 (1798) p. 38; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 447; id. in DC., Prodr. IX (1845) p. 353; MIQ., Fl. Ned. Ind. II (1857) p. 603; id., Suppl. (1860) p. 235, 561; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 205; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 218; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 265.

M. tridentata (L., 1753) HALL. f. and *M. hastata* (DESR., 1789) HALL. f. seem to be so closely related that I do not hesitate to unite them as subspecies under the name of the former. (See remarks under ssp. *hastata*).

ssp. **genuina** (HALL. f.) VAN OOSTSTR., nov. ssp. — *M. tridentata* (L.) HALL. f. var. *genuina* HALL. f. mss. inedit. Fig. 2, J—N.

A prostrate herb; the stems several from a stout perpendicular root, angular, glabrous, 10 to 80 cm long. Leaves small, glabrous, 4—20(—30) mm long, (0.5—)1.5—4(—6) mm broad, linear (in some specimens nearly filiform) or linear-oblong to oblanceolate, spathulate or subquadrate, the apex obtuse, truncate or emarginate and mucronulate to tridentate (occasionally part of the leaves has the apex acute and mucronulate), the base not or slightly broadened, truncate to hastate, the auricles as far as present spreading or parallel with 1 tooth or with a few teeth, the leaf margin above the base entire or slightly crenate to dentate; petiole very short, ½—2 mm or nearly absent. Flowers in 1—2(—3) flowered cymes; peduncles axillary, glabrous or pubescent near the base, 8—15(—20) mm long; pedicels glabrous, angular, thickened above in fruit, 4—8 mm long; bracts minute, oblong, mucronulate. Flower-buds narrow-conical, acute. Outer sepals mostly shorter than the inner ones, oblong, obtuse to emarginate, mucronulate, 3—4 mm long, inner ones lanceolate, attenuate-acuminate into a slender point, 4—6 mm long, occasionally the outer sepals are not so distinctly obtuse at apex but more acute, more rarely the outer as well as the inner sepals are obtuse and mucronulate (so in specimens from British India, not seen in Malaysian specimens). Corolla funnel-shaped, completely yellow, yellowish white or white or with a purple centre, glabrous, 10—12 mm high. Filaments inserted about 1.5 mm above the base of the corolla, slightly dilated at their base and there glabrous or with a few short hairs. Disk low. Ovary glabrous; style filiform. Capsule ovoid, 4—5 mm high, 4-valved, the wall papery, glabrous, straw-coloured; seeds 4 or less, glabrous, black, opaque, 2—2¼ mm high.

MALAY PENINSULA; according to RIDLEY in sea sand. Without precise locality, MAINGAY 1147 (K, L); id., MAINGAY 2951, Apr. 1867—68 (K); Penang, Telok Bahang, open sandy places, CURTIS s.n., Aug. 1884 (S); Batu Feringhi, CURTIS 952, June 1886 (K, S); Trengganu, Bukit Tok Beng, HOLTTUM, Singapore Field n. 15249, May 1925 (S); Malacca, GRIFFITH s.n. (K); Tanjong Kling, sandy places, RIDLEY 3181, June 1892 (S); mouth of Linggi River, sandy places near coast, JAGOR 220, May 1858 (BD); Johore, Batu Pahat, RIDLEY 11114 (S); Singapore, CANTLEY 2931 (S); Changi, RIDLEY s.n. (S).

SUMATRA, Riouw and Dependencies, Anambas Islands, Temaja, padang near Letong, sea level, creeping in sand, HENDERSON, Singapore Field n. 20326, Apr. 1928 (B, S); Riouw Archipelago, P. Oedjan, near P. Bintan, near beach, 2 m, BÜNNEMEYER 6448, June 1919 (B, L); Bangka and Dependencies, Bangka AMAND s.n. (K); id., TEYSMANN 3392 HB (B, L, U); id., Muntok, near coast, TEYSMANN s.n. (B, BD, K, L); id., sand near sea, 4 m, BÜNNEMEYER 1468 (B); id., Tandjong Kalian, beach, common, 2 m, BÜNNEMEYER 1562, Oct. 1917 (B, L); Soengei Slan, TEYSMANN s.n. (B, L).

JAVA, West Java, without precise locality, PLOEM s.n. (L); a specimen from Bangka, cultivated in the Botanic Garden, Buitenzorg, TEYSMANN s.n. (L).

CELEBES, Pasoei, wayside, 600 m, KJELLBERG 1643, June 1929 (B).

Distribution: Tropical Africa, Mascarene Islands; tropical Asia from Bengal and Central Provinces southwards to S. India and Ceylon, eastwards to the Malay Peninsula and the Malay Archipelago.

Vernacular name: kong kong pasir (Malay Peninsula, RIDLEY).

ssp. **hastata** (DESR.) VAN OOSTSTR., nov. ssp. — *Convolvulus hastatus* DESR. in LAMK., Encycl. III (1789) p. 542, non SIEB., THUNB., FORSK. — *C. simplex* PERS., Syn. I (1805) p. 178, non SPR. — *Ipomoea denticulata* R. BR., Prodr. Fl. Nov. Holl., ed. 1 (1810) p. 485, non CHOISY; Bot. Reg. IV (1818) t. 317 — *Convolvulus denticulatus* (R. BR.) SPRENG., Syst. I (1825) p. 603 — *C. linifolius* WALL., Cat. (1828) n. 1389 — *C. Blumei* DIETR., Syn. Pl. I (1839) p. 675 — *Ipomoea Blumei* (DIETR.) STEUD., Nom. ed. 2, I (1840) p. 815 — *Merremia hastata* (DESR.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 117; id. in Versl. 's Lands Pl.t. 1895 (1896) p. 126; id. in Bull. Herb. Boiss. V (1897) p. 381; id. in Meded. 's Lands Pl.t. XIX (1898) p. 544; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509; COOKE, Fl. Bombay II (1905) p. 238; MERRILL in Philipp. Journ. Sc. I (1906) Suppl. p. 120; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 303; HALL. f. in VALETON, Pl. Pap. in Bull. Dep. Agric. Ind. Néerl. X (1907) p. 50; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 108; KOORDERS, Exk. fl. Java III (1912) p. 114; KOORD.-SCHUM., Syst. Verz. (1910—13) Conv. p. 2; id. (1914) p. 109; BOLD., Zakfl. Java (1916) n. 833; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 508; GAMBLE, Fl. Pres. Madras V (1923) p. 929; RIDLEY, Fl. Malay Penins. II (1923) p. 457; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 361; FORBES in Journ. Bot. LXIII, Suppl. (1925) p. 71; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 517 — *M. tridentata* (L.) HALL. f. var. *hastata* (DESR.) HALL. f. mss. inedit. Fig. 2, O.

Herb, usually twining, occasionally with prostrate stems. Stems one or several from a stout perpendicular root, slender, more or less angular to subalate, glabrous, 0.60 to 2.00 m long (BACKER). Leaves larger than in ssp. *genuina*, generally glabrous, 2.5—8(—10) cm long, 1.5—15(—20) mm broad, narrow-oblong, linear-oblong, linear or sometimes (especially the upper ones, or occasionally all) narrow-linear, more or less contracted above the base, gradually attenuate towards the distinctly mucronate, sharply acute, or obtuse or sometimes emarginate apex, the base with more or less stemclasping, obscurely to sharply dentate auricles, the leaf margin above the base entire or indistinctly undulate; petiole nearly absent or very short, 1—3 mm long. Flowers in 1—few-flowered cymes; peduncles axillary, thin, glabrous or mostly pubescent near the base, 1—8 cm long; pedicels as long as or longer than the calyx, glabrous, angular, thickened above in fruit, 6 mm or longer, in fruit to 15 mm long; bracts minute, subulate. Flower-buds narrow-conical, acute, the tips of the sepals more or less curved outwards. Sepals equal in length or the exterior ones a little shorter (5—) 6—7(—10) mm long, glabrous, all lanceolate to ovate-lanceolate, attenuate-acuminate into a sharp, slender point, the margin of the sepals narrowly scarious, undulate. Corolla funnel-shaped, completely pale yellow or white or with a purple to chocolate brown centre, glabrous, 12—20 mm high. Filaments inserted about 3 mm above the base of the corolla, slightly dilated at their base and there with a few short hairs. Disk low. Ovary glabrous, style filiform. Capsule globose to ovoid, 4-valved, the wall papery, glabrous; the dissepiment often persistent after dehiscence of the fruit; seeds 4 or less, black or dark-grey, opaque, glabrous, 2.5—3 mm high.

Malay Peninsula; according to Ridley very common in grassy spots, climbing over bushes. Without precise locality, Maingay 1146 and 3067, Dec. 1867 (K); Perlis, Gua Nangka, Henderson, Singapore Field n. 23070, Nov. 1929 (S); Kedah, Kampong Naka, 100 ft, Holttum, Singapore Field n. 19812, Sept. 1933 (S); Kelantan, Kuala Lebir, common, Gimlette s.n., July 1904 (S); Penang, coast, Curtis 1068, Oct. 1886 (S); Ayer Etam, Curtis s.n., Nov. 1898 (S); road D.B. (Dayang Bunting) Pulau, Curtis 1068, March 1892 (S); Perak, Scortechini 138 (BD); Cantley's collector (S); Wray Jr. 1751, Apr. 1888 (S); Ipoh, Burkill, Singapore Field n. 2786, Nov. 1917 (S); Kuala Wok, Wray Jr. 859 (S); rocks in Kuala Temengor, Ridley 14259, July 1904 (S); Taiping, Henderson, Singapore Field n. 10364, Jan. 1923 (S); Taiping, Maxwell's hill, Henderson, Singapore Field n. 10083, Jan. 1922 (S); Pahang, Rompin R., Leban Chondong, Evans s.n., July 1917 (K); Balok, ?, Singapore Field n. 207, June 1913 (S); Penor, common in old dunes and swards, Corner s.n., Aug. 1935 (S); Katapang, Ridley 1236, May 1890 (S); Kuala Pahang, Ridley 1049, May 1890 (S); Kuala Tahan, 350 ft, Seimund 281 and 314, Nov. 1920 (S); S. Sat, Ulu Tembeling, Henderson, Singapore Field n. 21945, July 1929 (S); Pulau Tioman, Telok Paya, seashore, Henderson, Singapore Field n. 18431, May 1927 (B, S); id., Jaora Bay, very abundant, Burkill s.n., June 1915 (S); Negri Sembilan, Gunong Beremban, Alvins 1875, June 1885 (S); Selangor, Rantau Panjang, Kloss 36, July 1914 (K); Malacca, Griffith s.n. (K); Alvins 19 (S); Tebong, Burkill, Singapore Field n. 561, July 1914 (S); Johore, below Gunong Pulai, Ridley s.n. (S); S. Rhu Reba, Corner, Singapore Field n. 28656, June 1934 (S); Singapore, Hullett 5, Nov. 1885 (S); Cantley s.n. and 2865 (S); Symington 22987, July 1930 (S); Botanic Gardens, waste places, Md Nur s.n., June 1924 (S); Chanji, sandy sea coast, Burkill s.n., Febr. 1913 (S); Ang Mo Kio, Ridley s.n. (S).

Sumatra, without precise locality, Korthals 52, 127, 207 (L); East Coast, Simeloengoen, Yates 1869 (L); vic. of Medan, behind the beach, Docters van Leeuwen 3120, Febr. 1919 (B); Gedong djohore, S. of Medan, grassy sunny places, c. 50 m, Lörzing 3518, Febr. 1915 (B); Sibolangit, not rare, c. 500 m, Lörzing 4208, Jan. 1916 (B); Pematangsiantar, 750 m, Winckel 1220β, Febr. 1923 (B); E. of

Loeboekpakam, grassy dike of railroad, rare, c. 20 m, Lörzing 3330, Oct. 1914 (B); Haboko estate, c. 150 m, Docters van Leeuwen 3180, Febr. 1919 (B); Tapanoeli, Toba, fort of Dolok Tolong, c. 1050 m, on open dry rocky soil, common, Ouwehand 202, June 1896 (B); Toba highland, S. of Balige, near Tanga Batoe, on rocks, rare, 1200 m, Huitema 100, Sept. 1931 (B); Oeloean, Ouwehand 148, March 1896 (B); Upper Bila-plain, Aek-boero, bushes, c. 80 m, Lörzing 9612, Apr. 1923 (B); West Coast, Padang, Korthals s.n. (L); id., sandy soil, without collector's name, n. 228, Apr. 1870 (B); Apenberg, Junghuhn, Aug. (L); Kajoe tanam, c. 130 m, Beccari 836, Sept. 1872 (K, L); Sandaran agong, 2450 ft, Robinson and Kloss s.n., May 1914 (K); Kerintji valley, c. 850 m, Bünnemeyer 8364, Febr. 1920 (B, L, S); near G. Malintang, alang field, 1150 m, Bünnemeyer 3758, July 1918 (B); foot G. Malintang, alang field, 780 m, Bünnemeyer 4420, Aug. 1918 (B); near Atar, riverside, Kleinhoonte 540, Aug. 1932 (B); Ophir district, 212 m, Bünnemeyer 261, Apr. 1917 (B); W. slope of Talaman, common, 350 m, Bünnemeyer 319, Apr. 1917 (B); Bt. Boekoe, S. of Baso, 900 m, Bünnemeyer 1243, June 1917 (B); Bengkoelen, Kroeï, Cramer 123, Sept. 1915 (B); Lampoengs, Gedong-tetahan, 400 ft, Forbes 1287a (according to Journ. Bot. LXIII, Suppl. (1925) p. 71); Palembang, Batoe Pantjeh, on Moesi R., 350 ft, Forbes 2680 (L); Djambi, Doesoen Baroe, on Merangin R., 200 m, Posthumus 859, Sept. 1925 (B, L, S); id., Posthumus 891, Sept. 1925 (B); Riouw and Dependencies, Riouw Archipelago, P. Bintan, Lobam, 20 m, Bünnemeyer 6240, June 1919 (B, L, S, U); id., P. Bintan, S. Poelei, wayside, 40 m, Bünnemeyer 6350, June 1919 (B, L); Lingga Archipelago, P. Selajar, Gg. Selajar, beach, 5 m, Bünnemeyer 7408, Aug. 1919 (B, L); Anambas and Natoena Islands, Boengoeran, Ranai, sandy way, very common, 5 m, van Steenis 1135, Apr. 1928 (B, L, S); Bangka and Dependencies, Bangka, Amand s.n. (L, U); Muntok, wayside, common, 10 m, Bünnemeyer 1408, Oct. 1917 (B, L, S); Soengailiat, Beloetan, 70 m, Bünnemeyer 1618, Oct. 1917 (B); Soengailiat, Tiangtara, ladang, 60 m, Bünnemeyer 1868, Nov. 1917 (B); Soengailiat, Kp. Paritpadang, wayside, common, 80 m, Bünnemeyer 1927, Nov. 1917 (B, L).

Java, according to Backer from W. to E. Java, in the lower parts, on rather light soil, on fields, grasslands, waste places, waysides. Without precise locality, Horsfield s.n. (K, L, U); Junghuhn s.n. (L); Korthals 122 (L); Millet s.n. (K); Nagel 182 (BD); Ploem s.n. (B); Reinwardt s.n. (L); de Vriese s.n. (L); Bantam, Nieuw-Tjisalak estate, near Rangkasbitoeng, c. 60 m, de Vries 55, May 1922 (B); G. Kantjana, waysides, common, Koorders 41117β, June 1912 (B, L); between G. Kantjana and G. Kendeng, wayside, in grass, 300 m, Backer 1296, June 1911 (B); G. Karang, 600 m, Koorders 40632β, May 1912 (B); between Panjawoengan and Bajak, in grass and thickets, Backer 1603, June 1911 (B); Pasir Ajoenan, a common weed on shadeless spots, 150—200 m, Backer 1949, June 1911 (B); Batavia, Batavia, Vorderman s.n. (B); Laanhof, Backer 34194 (B); Sabangan near Weltevreden, Bakhuizen van den Brink fil. 3677, May 1925 (B); Kebajoran near Mr. Cornelis, Backer 34193, Jan. 1903 (B); Wanajasa, 500 m, Backer 14352, June 1914 (B); Krawang, Korthals 102 (L); Tjikoempai estate, E. of Poerwakarta, c. 110 m, Harmsen 95 (B); near Tjikoja, Zollinger 141, June (BD, K, L); Buitenzorg, Kuhl and van Hasselt s.n. (L); id., Boerlage s.n., Febr. 1888 (L); id., cultivated in the Botanic Garden, Teysmann s.n. (L); id., id., n. XV. K. B. XII. 10 and XV. II. 40 (B); way to Kotabatoe, in hedges, Hallier 208d, March 1893 (B); above Bandongan, railroad, Hallier 208a, Apr. 1893 (B); near Baranansiang, in sweet-potatoe field, Hallier 208c, May 1893 (B); near Waroeng mangga, Hallier 208b, May 1893 (B); Moeara Tjiomas, Boerlage s.n., Sept. 1888 (L); Tjiomas, Soengandiredja 112, March 1900 (B, L); Djasinga, in tea-plantation, 200 m, Backer 10464, Dec. 1913 (B); Soekaboemi, dry fields, 400 m, Backer 15075, July 1914 (B); between Tjipeujeum and Radjamadjala, alang field, 300 m, Backer 13451, May 1914 (B); Tjiloear, 150 m, Backer 22200, Jan. 1917 (B); Tjitjoeroeg, Djampang-koelon, sunny wayside, 325 m, Backer 17263, Nov. 1914 (B); Tjiratjap, Djampang-koelon, 100 m, Backer 17459, Nov. 1914 (B); Tjidaoen near Palaboehan, beach, Koorders 34666β, Apr. 1899 (B, L); Priangan, Bandjar, Bantar dawa, Backer 34271, Dec. 1910 (B); Bandjar-Sindanglaja (?); Scheffer s.n., Oct. 1871 (B); isl. Noesagede, lake of Pendjaloe, Tasikmalaja, 720 m, Koorders 47913β, Aug. 1917 (B); Babakan, Lehmann s.n. (BD); Cheribon, Tjipetir, Went and de Monchy s.n., May 1890 (L); id., de Monchy s.n. (B); between Haoergeulis and Tjipoenegara, railroad, 25 m, Backer 16829, Oct. 1914 (B); Pekalongan, Soebah, virgin forest, Koorders 36903β, May 1899 (B, K, L); Banjoemas, Banjoemas, Kievits 3261 (Pa); hills between Banjoemas and Mandirantjang, Kievits, Banj. 95, Oct. 1923 (Pa); Poerbolinggo, hills, 125 m, Denker 25, June 1911 (B, L, U); Pringombo, Koorders 27179β, Apr. 1897 (B); Semarang, Semarang, de Visser Smits s.n. (B); Djapara-Rembang, Ngarengan, teak-wood, Koorders s.n., Jan. 1886 (B); id., Koorders 33504β, May 1899 (B); id., Koorders 33509β, May 1899 (B); id., Koorders 35603β, May 1899 (B); G. Moerja, c. 400 m, Docters van Leeuwen 955, Oct. 1912 (B); Bandjaran, Beumée 661, Sept. 1916 (B); Jogjakarta, near Jogjakarta, in rice-field, Junghuhn s.n., Apr. (L); Goenoeng Gambing, Junghuhn s.n., Apr. (L); Madioen, near Ngebel, grasslands, 800 m, Koorders 29874β, March 1898 (B); Kediri, E. Wilis, hedges, c. 600 m, Lörzing 805, Febr. 1914 (B); Gadoengan Pare, Koorders 22994β, May 1896 (B, L); Soerabaja, Madjakerta, Dorgelo 1899, June 1923 (Pa); Malang, Kepoeh, S.W. of Pasoeroean, wayside, 75 m, Bremekamp 8309, June 1913 (B, BD, L); Nongkodjadjar, M. Tengger, cultivated, 1230 m, Buysman 2913, Nov. 1909 (U); Probolinggo, beach, Altmann 497, Aug. 1935 (B); Besoeki, between Pantjoer and Pradjekan, very dry volcanic sterile soil, rare, 400 m, Koorders 32403β, Dec. 1898 (B); Ringgit, thickets, 3 m, Clason C. 82, May 1931 (B); Poeger, Koorders 21018β, Oct. 1895 (B); Bondowoso, mouth of Kali Soekamade, Booberg s.n., Sept. 1936 (B); id., Clason s.n., Sept. 1936 (B); Madoera, Bangkalan, alang fields, many specimens, 10 m, Backer 19008, Febr. 1915 (B); Tanahmerah, hedges, 50 m, Backer 19396, Febr. 1915 (B); Boernih, hedge, 10 m, Bremekamp s.n., May 1917 (B); Kangean-islands, Kangean, Kajoe Waroe, sandy field, 1 m, Backer 28206, Apr. 1919 (B); Saboenten isl., Saboenten, thickets, 10 m, Backer 29912, May 1919 (B); P. Mamboerit, sandy soil, frequent, 1 m, Backer 27262, March 1919 (B); Sepandjang, grassland, frequent, 1—5 m, Backer 28811, Apr. 1919 (B); id., fields, 1—2 m, Backer 29167, Apr. 1919 (B); Bangko, grassland, 2 m, Backer 29216, Apr. 1919 (B); Sapeken, plains behind the beach, frequent, 1 m, Backer 29289, Apr. 1919 (B); Sapapan, grassland, 5 m, Backer 28457, Apr. 1919 (B); Saoebi, grassland, 2 m, Mahlmeister (?) 6, March, 1919 (B); Paliat, in grass and thickets, frequent, 1 m, Backer 29353, May 1919 (B).

Borneo, without precise locality, Korthals 174, 185 (L); W. division, Singkawang, Pasir Pandjang, near Pontianak, Miss Polak 267, Dec. 1930 (B); Sanggau, Hallier 729 (B); Benkajang, Dunselman 42, July 1936 (B); Karimata islands, P. Karimata besar, ladang, Mondi 199, March 1931 (B, K, L, S); S. and

E. division, Bandjermasin, Motley 931 (K); Martapoera, Korthals 124 (L); Pagat, Grabowsky s.n., Nov. 1887 (?) (BD); Doesoen, Korthals 122 (L); according to Merrill, 1921, also in British North Borneo: Topping 1482.

Celebes, Manado, Manado, 10 m, Koorders 16552β, Dec. 1894 (B, L); near Amoerang, Koorders 16550β, March 1895 (B, BD, K, L); Tonsawang, Koorders 16551β, March 1895 (B, L); Celebes and Dependencies, S.W. Celebes, Lombasang, wayside, 950 m, Bünnemeyer 11151, Apr. 1921 (B); id., id., 1000 m, Bünnemeyer 11394, Apr. 1921 (B); Bontoparang, Rachmat 5, exp. van Vuuren, June 1913 (B); id., wayside, 50 m, Bünnemeyer 10579, March 1921 (B); id., wayside, 50 m, Bünnemeyer 10628, March 1921 (B); id., wayside, 50 m, Bünnemeyer 10662, March 1921 (B, K, L); Malino, wayside, 280 m, Bünnemeyer 10761, Apr. 1921 (B, U); Mamoedjoe, Rachmat 209, exped. van Vuuren, July 1913 (B); Maleiro, wayside, 280 m, Bünnemeyer 10871, Apr. 1921 (B); Baoe baoe, ladangs, 50 m, Kjellberg 106, Febr. 1929 (B); Boeton, Baoe baoe, coral-limestone, 0—75 m, Elbert 2629, Sept. 1909 (L); Moena, Lombai, 0—30 m, Elbert 2944, Aug. 1909 (L); Toekangbesi Islands, dry spots, Elbert 2565, July 1909 (L); Watamponi, Noerkas 209, exp. van Vuuren, May 1912 (B, L); Tanette, wayside, 500 m, Bünnemeyer 12538, June 1921 (B, L); Salajar, Teysmann 13888 (B); S. Salajar, thickets on beach, Docters van Leeuwen 1910, May 1913 (U); Bonerate, c. 50 m, Docters van Leeuwen 1445, May 1913 (B, U); marble island near T. Djampea, Docters van Leeuwen 1604, May 1913 (B, U); Kalao, behind the beach, Docters van Leeuwen 1533, May 1913 (B, U).

Lombok, Ekas, on shrubs, 10 m, Mrs. Rensch 420, Apr. 1927 (B, BD); Rindjani, N.E.-slope, Sembaloen-plateau, 1185—1265 m, Elbert 1506, May 1910 (L).

Soembawa, Sentoal, Colfs 121, Nov. 1879 (L); Bima, Doro-Roepah, near Waworada Bay, 200—400 m, Elbert 3849, Dec. 1909 (L); Dompoe, dry thickets, frequent, 80 m, Mrs. Rensch 850, May 1927 (BD).

Timor, without precise locality, Gaudichaud s.n. (BD); Reinwardt 1300 (L); Spanoghe 48 (L); duplicate specimens from the Paris herbarium, without collector's name (BD, L); Roti, Spanoghe s.n. (L).

Moluccas, Ternate, Tabahawa, field, Beguin 992, Oct. 1920 (B); Boeroe, Leksoela, 30 m, Toxopeus s.n., Aug. 1921 (B, L); Ceram, Selor, garden near beach, Kornassi 896, Jan. 1918 (B, BD, L, P, U); S.E. Ceram, Kilmoeri, garden near beach, Kornassi 754, Jan. 1918 (B, L, U); Ceramlaoet (according to Warburg, 1891); Amboina, Lesson 103 (BD); Robinson 1824, July-Nov. 1913 (B, K, L); Soja di bawa, Treub 562 (B, mixed with *Merremia hirta* (L.) Merrill); G. Nona, Boerlage 94, July 1900 (B); Karang pandjang, Rant 231, June 1929 (B, mixed with *Merremia hirta* (L.) Merrill); Timorlaoet, Riedel s.n. (K); Kai-islands, Jaheri 300 (B).

New Guinea, Dutch New Guinea, Merauke, Koch s.n., Aug. 1904 (B, L); id., alang field, Versteeg 1866, Nov. 1907 (B); Papua, Port Moresby, Goldie (according to von Mueller, 1876); id., sea shore, Carr 11852; Apr. 1935 (L); Thursday Island, Jaheri s.n., May 1901 (B).

Philippine Islands, according to Merrill throughout the Philippines in open grasslands at low altitudes, usually common; Luzon, prov. Benguet, Baguio, Elmer 8963, March 1907 (B, K, L); id., Sablang, Fénix, Bur. of Sc. 12678, Nov.-Dec. 1910 (S); prov. Nueva Vizcaya, vicinity of Dupax, McGregor, Bur. of Sc. 11341 and 11399, March-Apr. 1912 (L); prov. Zambales, Curran, For. Bur. 5853, Jan. 1907

(B); prov. Bataan, Lamao River, Mt. Mariveles, MERRILL 3105, Oct. 1903 (BD, K); id., ELMER 7030, Nov. 1904 (K); id., MEYER, For. Bur. 2503, Jan. 1905 (B, BD, K, S); prov. Rizal, RAMOS, Bur. of Sc. 13589, Aug. 1911 (B, BD, L); id., RAMOS 1981, Nov. 1914 (B, BD, L, S); id., Antipolo, MERRILL 83, Jan. 1910 (U); id., Manila, PERROTTET s.n. (L); id., San Francisco del Monte, LOHER 4164, Oct. 1891 (BD); prov. Laguna, Los Baños, ELMER 8128, Apr. 1906 (B, K); prov. Sorsogon, Irosin, Mt. Bulusan, ELMER 17171, Sept. 1916 (B, BD, K, L, U); Mindoro, Baco, MERRILL 1268 and 1270, Jan. 1903 (BD); isl. of Paragua, Point Separation, MERRILL 830, Febr. 1903 (BD); Mindanao, Bukidnon subprov., vicinity of Tanculan, FÉNIX, Bur. of Sc. 26073, July 1916 (B, S); prov. Agusan, Cabadbaran, Mt. Urdaneta, ELMER 13513, Aug. 1912 (B, BD, K, L, U); Tawitawi Isl., RAMOS and EDAÑO, Bur. of Sc. 44196, July-Aug. 1924 (B, S).

Distribution: Tropical East Africa, tropical Asia from the Khasia Hills and Bengal southwards to Ceylon, eastwards and southwards to China, the Malay Peninsula, the Malay Archipelago and tropical Australia.

Vernacular names: akar kurumak (Malay Peninsula, RIDLEY), kankong paya (Malay Peninsula, ALVINS); karok relia (Malay Peninsula, Singapore Field n. 207), pungulang (Malay Peninsula, GIMLETTE); sanem-sanem (Mal., Sumatra, Padang); kangkong rimboe (Sund., Sumatra, Padang); akar tali tali (Sumatra, West Coast, Ophir district, BÜNNEMEYER); toelan dalin (Sumatra, Djambi, POSTHUMUS); klitang, djangoet boang (Bangka, BÜNNEMEYER); irit-iritan (Java, Djapara-Rembang, KOORDERS); rangitan (Java, Djapara-Rembang, BEUMÉE); pakissan rambat (Java, Kediri, KOORDERS); kitjoke (Madur., Java, Besoeki, KOORDERS); mawow-entoet (Tontemboan language, Minahassa, KOORDERS); loeré-loeré (Celebes, Bontoparang, RACHMAT); dongi-dongi (Celebes, Gg. Boting, RACHMAT); kradjok (Celebes, Bontoparang, BÜNNEMEYER); lilah kali sarang (Celebes, Mamoedjoe, RACHMAT); djala ma toeboe (Ternate, BEGUIN); goewi djala (Tidore, BEGUIN); sapoetangan doewa (= two handkerchiefs, a fantastic name, according to BACKER; Ceram, KORNASSI); karadkad (Philipp., Igorot language, MERRILL); maragta, talanuk (Philipp., Tagálog language, MERRILL); tatalon (Philipp., Manóbo language, MERRILL); sigid (Philipp., Panay Bisáya language, MERRILL).

Use: "The leaf is made into poultice and applied to the head in cases of jungle fever" (Malay Peninsula, according to a note on a label, by ALVINS). Leaves used as a medicine in the Karimata islands, according to a label-note made by MONDI.

Remarks. 1. In ENGLER's Botanische Jahrbücher XVIII, 1894, p. 117 and 118, HALLIER distinguishes *Merremia angustifolia* (JACQ.) HALL. f. with its var. *ambigua* HALL. f. and *M. hastata* (DESR.) HALL. f., giving short descriptions of these species. Later on in his manuscripts in the library of the Rijksherbarium at Leiden, the same author unites the two species with a third one, *Merremia tridentata* (L.) HALL. f. under the name of the latter. The three species now get the rank of varieties. Typical *M. tridentata* is named *M. tridentata* var. *genuina* HALL. f. mss. inedit.; *M. angustifolia: M. tridentata* var. *angustifolia* (JACQ.) HALL. f. mss. inedit. and *M. hastata*: *M. tridentata* var. *hastata* (DESR.) HALL. f. mss. inedit.. The present author wishes to give to these three taxonomical units the rank of subspecies, under the name of ssp. *genuina* (HALL. f.) VAN OOSTSTR.; ssp. *angustifolia* (JACQ.) VAN OOSTSTR.[1]) and ssp. *hastata* (DESR.) VAN OOSTSTR.

2. According to HALLIER the var. *ambigua*, mentioned above, is identic with *Convolvulus filicaulis* VAHL, a species described just as *Merremia angustifolia* from Africa (Guinea). Now it is a remarkable fact that it is evident both from his description ("laciniis calicinis acuminatis") and from the specimens in the Leiden Herbarium bearing his handwriting, that BLUME, making the combination *Ipomoea filicaulis* (VAHL) BL., Bijdr. (1825) p. 721 (= *Convolvulus filicaulis* VAHL) used this name for Malaysian specimens only, namely for specimens belonging to var. *hastata* (ssp. *hastata* m.). After BLUME the name *I. filicaulis* was among others used by CHOISY, ZOLLINGER and MIQUEL (CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 448; id. in DC., Prodr. IX (1845) p. 353; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 603; id., Suppl. (1860) p. 235, 561). CHOISY used it for African and American as well as for Asiatic and Malaysian specimens. The specimens mentioned by ZOLLINGER and MIQUEL are all of Malaysian origin. It is evident that these authors did not distinguish the varieties in the sense of HALLIER, but united the material under one name. The same may be said of those authors who used the name *Ipomoea angustifolia* JACQ. for Asiatic, Malaysian and Australian specimens, as there are BENTHAM, CLARKE, FORBES, WARBURG, TRIMEN, MANSON BAILEY and GAGNEPAIN & COURCHET (BENTH., Fl. Austr. IV (1869) p. 425; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 205; FORBES, Wander. Germ. ed. II (1886) p. 222; WARB., in ENGL., Bot. Jahrb. XIII (1891) p. 412; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 217; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1065; id., Compr. Cat.

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[1]) **M. tridentata** (L.) HALL.f. ssp. **angustifolia** (JACQ.) VAN OOSTSTR., nov. ssp. — *Ipomoea angustifolia* JACQ., Collect. II (1788) p. 367; id., Icon. Rar. II (1786—93) p. 10, t. 317.

Queensl. Pl. (1909) p. 349; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 265).

7. **Merremia quinquefolia** (L.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509 — *Ipomoea quinquefolia* L., Spec. Pl. (1753) p. 162; GRISEB. in Mem. Am. Acad. N. S. VIII (1863) p. 526 — *Convolvulus quinquefolius* L., Syst. ed. 10 (1759) p. 923 — *Batatas quinquefolia* (L.) CHOISY in Mém. Soc. Phys. Genève VIII (1837) p. 49; id. in DC., Prodr. IX (1845) p. 339.

A herbaceous twiner; the stems slender, terete, striate or sulcate, glabrous or sparsely to densely hirsute with patent hairs. Leaves petiolate, petiole thin, glabrous or with few patent hairs, 2—5, occasionally to 9 cm long, limb palmately compound, with 5 leaflets, leaflets glabrous, sessile or shortly petiolulate, oblong or narrow-oblong to lanceolate or sometimes still narrower, attenuate towards both ends, the apex acute or obtusish, mucronulate, the margins coarsely dentate to undulate or almost entire; length of leaflets 2.5—6 cm; width 0.5—2 cm, the middle leaflet longer than the lateral ones. Inflorescences axillary, to c. 12 cm long; peduncles shorter to longer than the petioles, 4—7 cm, glandular upwards, the glands occasionally mixed with patent bristly hairs, 1-flowered or cymosely branched, and then 3- or sometimes to 5-flowered, the branches of the cyme glandular like the peduncle; pedicels glabrous or with some glands near the base, 5—7, sometimes to 15 mm long, in fruit to 15—20 mm and then thickened at the top. Bracts small, narrow-triangular, acute, about 1.5 mm long. Flower-buds ovoid, acute. Sepals narrow-ovate to oblong, obtuse, mucronulate, glabrous, subequal in length or the outer ones shorter, outer sepals 4—6, inner ones 6—8 mm long, slightly enlarged in fruit. Corolla pale yellow or white, funnel-shaped, 18—25 mm long, glabrous. Filaments inserted about 4 mm above the corolla base, glabrous except the broadened and shortly pubescent base; anthers spirally twisted. Ovary glabrous, style filiform, glabrous, stigma biglobular. Disk low, slightly lobed. Fruit a globose, straw-coloured capsule, opening by 4 valves, 4-celled, 4-seeded; valves c. 9 mm long; seeds black or greyish black, c. 4.5 mm long, shortly hairy with appressed curled hairs.

SUMATRA, Lampoengs, Bergen Estate, common in the forest, cultivated on the estate, Administrator of Bergen Estate 9, July 1934 (B).

JAVA, Buitenzorg, Buitenzorg, cultivated in the Botanic Garden, TEYSMANN (L); id., n. XVI. A. 4 and 4A (according to HALLIER); id., X. G. 153 (L); id., XV. H. 45 and XV. K. B. XIII. 11 (B); id., HALLIER C 13c, July 1893 (L); Besocki, Gerengredjo near Rambipoedji, foot of Yang, 50 m, coll. of the Experim. Station of Besoeki, June 1934 (B).

Moluccas, without precise locality, but most probably in Halmaheira, FORSTEN s.n. (B, L); Ternate, N. Castila, c. 40 m, BEGUIN 1605, May 1921 (B).

Distribution: Tropical America, Malay Archipelago (escaped from culture?).

Vernacular name: raoe tjanga (Ternate, BEGUIN).

Remarks: 1. According to notes on some collectors' labels (Administrator of Bergen Estate; Experim. Station of Besoeki) a very rapid grower, in a very short time covering all other plants. Perhaps of some value in culture as a cover crop.

2. *Merremia quinquefolia* is a species of American origin, which, however, was found already about 1840 in the Moluccas, probably in Halmaheira, by FORSTEN.

8. **Merremia tuberosa** (L.) RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 104 — *Ipomoea tuberosa* L., Spec. Pl. (1753) p. 160, non LOUR.; CHOISY in DC., Prodr. IX (1845) p. 362, excl. syn. STEUD.; MIQ., Fl. Ned. Ind. II (1857) p. 607 — *Convolvulus tuberosus* (L.) SPRENG., Syst. I (1825) p. 591, non VELL. — *Batatas tuberosa* (L.) BOJ., Hort. Maurit. (1837) p. 226 (not seen) — *? Convolvulus paniculatus* BLANCO, Fl. Filip. (1837) p. 96 — *Operculina tuberosa* (L.) MEISSN. in MART., Fl. Bras. VII (1869) p. 212; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 476, 549; id., l.c. XVIII (1894) p. 119; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; HALL. f. in Bull. Herb. Boiss. VII (1899) p. 410; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 308; RIDLEY, Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 363 — *I. nuda* PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 31 — *I. Glaziovii* DAMMER in ENGL., Bot. Jahrb. XXIII (1897) Beibl. n. 57, p. 40 (according to HALL. f. in Bull. Herb. Boiss. VII (1899) p. 410).

A quite glabrous perennial twiner. Stems from a large subterraneous tuber, robust, terete, finely striate, about 4—7 mm thick. Leaves orbicular in outline, 6—16 cm long and broad, palmately divided to far below the middle, segments 7, oblong-lanceolate, acuminate at the apex, gradually narrowed to the base, entire, the middle segment larger than the lateral ones; petiole slender, 6—18 cm long. Peduncles several-flowered, axillary, terete or more or less applanate above, 4—15 cm long; pedicels clavate, 15—18 mm long; bracts small, triangular, about 2 mm long. Two exterior sepals 23—25 mm long, ovate to broad-ovate, obtuse, with an indistinct very small mucro, the three interior ones narrower, oblong, the third about as long as the first and second, the fourth and fifth a little shorter, about 21—22 mm. Corolla yellow, funnel-shaped, glabrous, 5.5 cm long. Stamens inserted 4 mm above the base of the corolla, unequal in length, varying from 5—8 mm; anthers linear, twisted, 5 mm long. Style filiform, about 14 mm long; stigmas globose, papillose. Capsule 4- or less-seeded, large, the 4-seeded ones subglobose or depressed globose, about 3.5 cm in diam., the less-seeded ones elliptic, elliptic-globose or oblique-elliptic, with a smaller diameter; the capsule opens more or less irregularly by valves, the pericarp moreover loosens circularly at its base (see remarks), the wall is thin, straw-coloured, chartaceous; the capsule enclosed by the much enlarged sepals and borne by a stout clavate pedicel. Sepals in fruit to 5 or 6 cm long, the tips recurved, the pedicels to 5 cm long. Seeds large, about 17 mm long, black with a black pubescence on the sides and with somewhat longer, black hairs along the margins, glabrescent.

MALAY PENINSULA, Singapore, cultivated, HULLETT 645 (according to PRAIN l.c.); according to RIDLEY l.c. *M. tuberosa* "was formerly cultivated in the Botanic Garden, Singapore, and spread as far as across the road opposite, but has, I believe, now quite disappeared".

SUMATRA, West Coast, Fort de Kock, cultivated, Oct. 1930, JACOBSON 85 (B).

JAVA, Buitenzorg, Buitenzorg, cultivated in the Botanic Garden n. XV. H. 41 and 41A, according to HALLIER, 1896. A specimen collected near Buitenzorg, by BAKHUIZEN VAN DEN BRINK (7850), July 1931 (L) is probably escaped from culture; Malang, Bantoer, S. of Kepandjen, cultivated, July 1927, BACKER 36308 (Pa).

PHILIPPINE ISLANDS, according to MERRILL, 1923, occasionally cultivated.

Distribution: Probably of tropical American origin; distributed through tropical Africa, the Mascarene Islands, British India, Ceylon, cultivated and occasionally escaped in the Malay Peninsula and the Malay Archipelago.

Remarks. 1. Of this species I could examine in the collection of the Rijksherbarium at Leiden two fruiting specimens, one collected by HALLIER in the Botanic Garden at Buitenzorg and one of African origin. The fruits of the African specimen are subglobose or somewhat depressed globose, and 4-seeded. They show the limits of the valves quite distinctly by darker lines, and open quite regularly by 4 valves, which moreover loosen from the receptacle at their very base. The fruits from Buitenzorg are partly 4-seeded and subglobose, partly they are less-seeded and more elliptic or even oblique-elliptic. They show, in the same way as the African ones, the limits between the valves, marked by darker lines; the dehiscence of these valves is, however, as far as I can see, not so regular. When the capsule opens, the pericarp loosens as a whole from the receptacle, while the valves remain in connection with each other. Moreover the capsule can show some more or less irregular splits, irregular, as they do not always correspond with the original limits of the valves. Though the capsule wall loosens here, as has been described above, as a whole, at its base from the receptacle and forms in this way a kind of "operculum", this "operculum" is completely different from that, known in the genus *Operculina.* In *Operculina* we have a fruit of which the wall shows two distinct layers, the outer one of these layers, the epicarp, is more or less fleshy in the upper part (the lid, operculum) and is circumscissile, while the endocarp which is scarious, remains at first entire and splits at length irregularly. After this explanation it is clear that there is no reason to unite the genera *Merremia* and *Operculina* as has been done by some authors, for instance by BAKER and RENDLE in the Flora of Tropical Africa. These authors, in describing the genus *Merremia,* say that they "cannot distinguish generically the larger-flowered and fruited species which have been regarded as forming a distinct genus *Operculina.* The transverse dehiscence of the fruit is not general in this small group." We see, however, that the way in which the capsule opens is surely of importance and that this characteristic is a sufficient one in distinguishing the two genera.

2. HASSKARL mentions a var. *oligantha* HASSK., Retzia I (1855) p. 69. He describes this var. with the following words: pedunculis pauci-(6—7-)floris, petiolo brevioribus, sepalis in alabastro acuminatim convolutis, foliorum lobis acuminatissimis. *Folia* 3—5 poll. longa, 3½—7 poll. transversim lata *corolla* aurea 2 poll. alta et 2½ poll. diametro in limbo; *calyx* glaberrimus, in anthesi convolutus, connivens, in fructu patentissimus siccus, sepalis apice subrevolutis, 2 poll. fere longis; *fructus* pericarpium pergamaceum vix hinc inde in suturis valvarum dehiscens, demum basi solutum, operculatim deciduum; loculi 2-, abortu 1-spermi; *semina* nigra velutina, 8 lin. longa, 4 lin. lata, antice plana dorso convexa.

The type of this var. is unknown to me; the description undoubtedly refers to a plant which hardly differs from typical *Merremia tuberosa.* HASSKARL states that specimens of his variety were introduced in Java from Sydney, and that the natives call it Aroij kawoijang.

9. **Merremia aegyptia** (L.) URB., Symb. Antill. IV (1910) p. 505; GAMBLE, Fl. Pres. Madras V (1923) p. 928 — *Ipomoea aegyptia* L., Spec. Pl. (1753) p. 162 — *Convolvulus pentaphyllus* L., Spec. Pl. ed. 2

(1762) p. 223 — *Ipomoea pentaphylla* (L.) JACQ., Collect. II (1788) p. 297; id., Ic. Plant. Rar. II (1786—93) p. 10, t. 319; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 202; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 239 — *Batatas pentaphylla* (L.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 436; id. in DC., Prodr. IX (1845) p. 339; MIQ., Fl. Ned. Ind. II (1857) p. 600; id., Suppl. (1860) p. 235 — *Merremia pentaphylla* (L.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 115; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; COOKE, Fl. Bombay II (1905) p. 239; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 108; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 110; HALL. f. in Meded. Rijksherb. Leiden 1 (1911) p. 21; KOORDERS, Exk. fl. Java III (1912) p. 113 — *Operculina aegyptia* (L.) HOUSE in Bull. Torr. Bot. Club XXXIII (1906) p. 502.

Twiner. Stems slender, terete, hirsute with many yellow-brown patent hairs. Leaves palmately compound, with 5 leaflets, the leaflets sessile, elliptic or elliptic-oblong, entire, acute or acuminate at the apex, acute at the base, appressed pilose on both surfaces, 2.5—10 cm long and 1—4 cm broad; petiole slender, as long as or longer than the blade, patently hirsute, 2.5—12 cm long. Peduncles patently hirsute, few- to several-flowered, 5—24 cm long; bracts small, lanceolate, 2—4 mm long, deciduous; pedicels patently hirsute, 10—25 mm long. The 3 outer sepals ovate-lanceolate, acute or acuminate, 15—25 mm long, densely hirsute, the 2 inner ones glabrous, ovate, acute, slightly shorter. Corolla 2.5—3.5 cm long, funnel-shaped, white, glabrous. Anthers spirally twisted. Ovary glabrous, 4-celled. Capsule globose, glabrous, 4-celled, 4-valved, 4-seeded. Seeds glabrous.

JAVA, cultivated (according to KOORDERS).

Distribution: Tropical America, tropical Africa, India, Pacific Islands.

10. Merremia dissecta (JACQ.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552 (*M. disecta*); id. in ENGL., Bot. Jahrb. XVIII (1894) p. 114; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509; COOKE, Fl. Bombay II (1905) p. 240; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr., IV, 2 (1905) p. 104; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 110; GAMBLE, Fl. Pres. Madras V (1923) p. 928 — *Convolvulus dissectus* JACQ., Obs. II (1767) p. 4; id., Hort. Vindob. II (1772) p. 74, t. 159 — *Ipomoea dissecta* (JACQ.) PERS. in L., Syst. ed. XV (1797) p. 207, in nota, non WILLD.; PURSH, Fl. Am. Sept. I (1814) p. 145 — *I. sinuata* ORTEGA, Hort. Matr.

Dec. VII (1798) p. 84; CHOISY in DC., Prodr. IX (1845) p. 362; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 214; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1058; id., Compr. Cat. Queensl. Pl. (1909) p. 347 — *Operculina dissecta* (JACQ.) HOUSE in Bull. Torr. Bot. Club XXXIII (1906) p. 500.

Twiner. Stems slender, terete, striate, patently hirsute, glabrescent. Leaves palmately divided nearly to the base, with 5—7 lanceolate, mucronulate, coarsely dentate to irregularly pinnately lobed segments, glabrous or hairy on the veins beneath, the middle segment 2.5—10 cm long, 0.5—3 cm broad, the lateral ones and especially the basal ones smaller; petiole 2.5—7 cm long, patently hirsute like the stems. Peduncles patently hirsute, glabrescent in the upper portion, 1- or few-flowered, 5—10 cm long; pedicels thickened above, 1.5—2 cm long, glabrous, minutely verrucose at the top. Flower-buds narrow-ovoid, acute. Sepals large, ovate-lanceolate, acute, mucronulate, glabrous, subequal, 2—2.5 cm long, herbaceous with narrow scarious margin, afterwards enlarged and coriaceous in fruit. Corolla 3—3.5 cm long, funnel-shaped, white, with a rose or purple throat, the limb with 5 distinct bands. Anthers spirally twisted. Disk cup-shaped. Ovary glabrous, 2-celled. Capsule globose, glabrous, 2-celled, 4-valved, normally 4-seeded. Seeds glabrous.

JAVA, Buitenzorg, Buitenzorg, cultivated in the Botanic Garden, HALLIER C. 162a, Oct. 1894 (L); Madoera, Sapoeloe, cultivated, BACKER 21115, June 1916 (B).

Distribution: Probably indigenous only in America: Southern United States, Central America, West Indies, South America to Argentina and Uruguay; Africa: Upper Guinea, Cordofan, Seychelles; becoming naturalized in British India, as a garden escape; also in Australia: Queensland.

11. Merremia vitifolia (BURM. f.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; id. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509; COOKE, Fl. Bombay II (1905) p. 239; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 303; MERRILL and ROLFE in Philipp. Journ. Sc. III (1908) p. 122; KOORDERS, Exk. fl. Java III (1912) p. 113; KOORDERS-SCHUM., Syst. Verz. (1910—13) Conv. p. 3; BOLD., Zakfl. (1916) n. 832; MERRILL in Philipp. Journ. Sc. XIX (1921) p. 374; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 509; GAMBLE, Fl. Pres. Madras V (1923) p. 928; RIDLEY, Fl. Malay Penins. II (1923) p. 457; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 362; BEUMÉE in Hand. 3e N. I. Natuurw. Congr. (1924) p. 178; RENDLE in Journ. Bot. LXIII, Suppl. (1925) p. 71; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 517 — *Convolvulus vitifolius* BURM. f., Fl. Ind. (1768) p. 45, t. 18, fig. 1; ROXB., Fl. Ind. II (1824) p. 61 (not seen); WALL, Cat. (1828) n. 1348; ROXB., Fl. Ind. I (1832) p. 476 (*C. vitifolius* WILLD.) — *C. angularis* BURM. f., Fl. Ind. (1768) p. 46, t. 19, fig. 2; HASSK., Pl. Jav. Rar. (1848) p. 519 (*C. angularis* L.) — *Ipomoea vitifolia* (BURM. f.) BLUME, Bijdr. (1825) p. 709; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 454; id. in DC., Prodr. IX (1845) p. 361; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 607; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 213; FORBES, Wander., Germ. ed. II (1886) p. 222; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 413; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 224; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 269 — *Convolvulus pilosus* NORONH., Verhandel. Batav. Gen. V (1827) p. 71, nomen nudum (ex HASSK.) — *Ipomoea angularis* (BURM. f.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 454 — *I. vitifolia* (BURM. f.) BLUME var. *angularis* (BURM. f.) CHOISY in DC., Prodr. IX (1845) p. 361; MIQ., Fl. Ned. Ind. II (1857) p. 607.

A large twiner; the stems terete, the older ones striate, 2—4 m (BACKER), glabrous or patently hirsute with long white or fulvous hairs. Leaves petiolate, the petiole short or long, 2—15 cm long, or occasionally longer, with patent hairs like the stems or glabrous; the blade orbicular in outline, cordate at the base, palmately 5—7-lobed, the lobes broad-triangular to lanceolate, more or less acuminate or acute to obtuse at the apex and mucronulate, mostly not contracted at the base or sometimes slightly so, coarsely dentate to crenate or subentire, sparsely to densely hairy on both sides, more densely beneath than above, or glabrous above; total leaf-blade 5—18 cm long and 5—16 cm broad. Inflorescences axillary, pedunculate, the peduncles shorter or longer than the petiole, 1—15 cm or more, patently hirsute, 1—3- or several-flowered; bracts small, subulate, 1.5—2 mm; pedicels hirsute like the peduncles, 8—20 mm long, thickened above, clavate in fruit. Flower-buds narrow-ovoid, acute. Sepals oblong to ovate-oblong, obtuse or acutish, mucronulate, the outer ones more or less hirsute, glabrescent, the inner ones glabrous, all with glandular pellucid dots, 12—20, in fruit to 20 or 25 mm long and then thick, subleathery, whitish inside and with many glandular pits. Corolla bright-yellow, funnel-shaped, glabrous; the midpetaline bands distinctly 5-nerved, the limb with 5 obtuse lobes; length of corolla 5—6 cm, or sometimes less; width of limb c. 7 cm. Anthers spirally twisted. Ovary globose, glabrous. Disk low, annular. Capsule subglobose, papery, straw-coloured, about 12 mm high, 4-valved, 4- or less-seeded. Seeds 6—7 mm, black or blackish-brown, opaque, glabrous.

Malay Peninsula, according to Ridley common on river banks, creeping in sand and over bushes. Perak, Batu Gajah, Burkill and Haniff, Singapore Field n. 13369, June 1924 (S); Kuala Kangsar, Ridley s.n., March 1892 (S); Ipoh, very common, Burkill, Singapore Field n. 2781, Nov. 1917 (S); Pahang, Kuala Tahan, 350 ft, Seimund 36, Nov. 1920 (S); Bentong, c. 300 ft, Burkill and Haniff, Singapore Field n. 16421, Nov. 1924 (S); Lubu (Lubok) Pelang, Ridley s.n., Aug. 1891 (S); Gali near Raub, Burkill and Haniff, Singapore Field n. 16819, Nov. 1924 (S). According to Ridley also in Perlis and in Kelantan.

Sumatra, East Coast, Gedong djohore, S. of Medan, thickets, frequent, c. 50 m, Lörzing 3519, Febr. 1915 (B); Tandjoeng, Karoland, thickets, Lörzing 9008, May 1922 (B); West Coast, Doekoe, Korthals 250 (L); W. slope of Talakmau, Ophir district, common, 300 m, Bünnemeyer 306, Apr. 1917 (B); near Soekamenanti, Ophir district, alang field, bushes, 120 m, Bünnemeyer 207, Apr. 1917 (B); Lampoengs, Teloekbetoeng, Elbert s.n. (L); Isl. Sebesi, frequent, Docters van Leeuwen 5379, Apr. 1921 (B); id., N.E.-side, frequent, Docters van Leeuwen 5208, Apr. 1921 (B); Palembang, Batoe-Pantjeh, 550 ft, Forbes 2651 (BD, L).

Java, according to Backer from West to East Java, from the lowlands to the lower parts of the mountains, in parts with a faint as well as in parts with a rather strong east monsoon, in thickets and hedges and along waysides. Without precise locality, Blume s.n. (B, L, U); van Hall 110 and 255 (L); Millet s.n. (K); Bantam, between G. Kendeng and Malingping, wayside, in thickets, 100—300 m, Backer 1305, June 1911 (B); Sadjira, thickets, 100—150 m, Backer 2136, June 1911 (B); Pandeglang, thickets, 200 m, Backer 7435, March 1913 (B); Batavia, Backer 35438 (B); near Weltevreden, Junghuhn 33 and 35 (L); waterfall near Tjikao, Blume 1220 (L); Sentiong, Backer 35439 (B); between Kota Bamboe and Djembatan Doeren, Backer 35437 (B); Tanahabang, hedges, Hallier s.n., Aug. 1896 (B); Kerendang, Backer 35436, June 1903 (B); Bidaratjina, Edeling? s.n. (B); G. Parang near Poerwakarta, thickets, 500 m, Backer 13960, June 1914 (B); Tjikoja, thickets, Zollinger 431, Aug. (BD, K, L); Buitenzorg, Buitenzorg, Kuhl and van Hasselt 155, June (L); id., Hallier 209a, March 1893 (B); Waroeng mangga, Hallier s.n., Sept. 1896 (B); Tji Seeng, Koeripan, limestone rock, 125 m, Backer 25475, July 1918 (B); near Tjiomas, frequent, 350 m, Bakhuizen van den Brink 4054, Aug. 1920 (B); Tjiomas, Boerlage s.n., Sept. 1888 (L); Sinang barang, Boerlage s.n., Nov. 1888 (L); Tjinaroea, Tjibodas, Raap 900, July 1894 (L); G. Katé near Soekaboemi, edge of sec. forest, 400 m, Backer 15064, July 1914 (B); Tjitjoeroeg, Djampang-koelon, thickets, 325 m, Backer 17265, Nov. 1914 (B); Tjisokan, Ploem s.n. (B); Tjampea, Kuhl and van Hasselt 153, July (L); Palaboehan, Ploem (19767) (B); id., 50 m, Koorders 34671β, Apr. 1899 (B); Palaboehan Ratoe, Boerlage s.n., July 1888 (L); Tjiloa, near Zandbaai, thickets, 25—50 m, Backer 25630, Aug. 1918 (B); Priangan, Ploem s.n. (L); Bandoeng, Jagor 520 (BD); id., van der Veen s.n., herb. v. O. 821, Sept. 1923 (L); valley of Tjitaroem, disafforested summit, c. 600 m, Hochreutiner 1666, July 1904 (Genève); above Padalarang, limestone hills, van Steenis 5091, Sept. 1931 (B); Bandjar, thickets, 50—100 m, Backer 4260, Aug. 1912 (B); Soekaradja near Tasikmalaja, thickets, 250 m, Backer 8482, Aug. 1913 (B); Cheribon, G. Tjerimai, thickets, 760 m, Backer

4825, Oct. 1912 (B); Pekalongan, near Gringsing, 10 m, Koorders 36861 β, May 1899 (B, L); between Dara and Bandar, thickets, 300 m, Backer 15600, Sept. 1914 (B); forestry E. Tegal, teak-wood, 40 m, Beumée 4378, Aug. 1919 (B); Magelang, Temanggoeng, rather rare, waste places, c. 550 m, Lörzing 588, Aug. 1912 (B, BD); Semarang, Tjandi, dry hills, 100 m, Docters van Leeuwen 594, Aug. 1912 (B); between Weleri and Soebah, thickets, frequent, 1 m, Backer 16557, Sept. 1914 (B); Daroepana, teak-wood, 100 m, Backer 16434, Sept. 1914 (B); near Kedoengdjati, Koorders 24507 β, Sept. 1896 (B, L); id., Koorders 24530 β, Sept. 1896 (B, L); id., Koorders 25044 β, Sept. 1896 (B); id., Koorders 25057 β, Sept. 1896 (B); Djapara-Rembang, Ngarengan, Koorders 33510 β, May 1899 (B); Bandjaran, edge of forest, Beumée 660, Sept. 1916 (B); id., Beumée 716, Sept. 1916 (B); Padangan, thickets, Beumée 999, Aug. 1917 (B); forestry Nanas, teak-wood, c. 100 m, Beumée 5341, Aug. 1920 (B); Jogjakarta, G. Gambing, Junghuhn s.n., Oct. (L); G. Prambanan, forest, Junghuhn s.n., Aug. (L); Madioen, Ngawi, 300 ft, Soeradji 12, May 1918 (B); lake of Ngebel, 730 m, Wisse 743, Sept. 1921 (B); near Ngebel, Koorders 29193 β, Aug. 1897 (B, BD, L); Patjitan (according to Miquel, 1857, p. 607), Horsfield Conv. 19 (K); Kediri, forestry Krondong, teak-wood on marl, 125 m, Grutterink 3083, July 1918 (B); Soerabaja, Soerabaja, Dorgelo 779, Aug. 1922 (Pa); Koepang near Soerabaja, 20 m, Bremekamp s.n. (B); Malang, Tengger, 400 m, Buysman 210, Aug. 1907 (U); foot of Tengger, teak-wood Kepoeh, c. 150 m, Bijhouwer 37, Nov. 1932 (B); S. of Bantoer, Gondanglegi, 200 m, Backer 3925, June 1912 (B); G. Baoeng, near Lawang, 400 m, Bijhouwer 77 (B); Besoeki, Poeger, thickets, 5—10m, Backer 18259, Dec. 1914 (B); id., Koorders 21069 β, Oct. 1895 (B); id., Koorders 21077 β, Oct. 1895 (B); id., Koorders 21128 β, Oct. 1895 (B, L); id., sandy soil, 10 m, Koorders 21078 β, Oct. 1895 (B); Soemberwringin, E. of Bondowoso, sec. thickets, frequent, 700—750 m, Backer 9473, Oct. 1913 (B); Litjin, virgin forest, 400 m, Koorders 43184 β, July 1916 (B); Pantjoer, virgin forest, Koorders 28509 β, Aug. 1897 (B, L); between Pantjoer and Pradjekan, sterile, volcanic, very dry soil, Koorders 32408 β, Dec. 1898 (B); Tjoeramanis, virgin forest, Koorders 28756 β, Sept. 1897 (B); G. Idjen, N.-slope, above Bajeman, thickets, 500 m, Backer 24981, June 1918 (B); Djember, Ultée 7 (B); Madoera, Kangean-islands, Kangean, Ardjasa, 25 m, Backer 27225, March 1919 (B); id., Kangean, Kalikatak, Dommers 101, Sept. 1919 (B).

Borneo, S. and E. division, Bandjermasin, Motley 310 (K).

Celebes, Celebes and Dependencies, Lombasang, wayside, 950 m, Bünnemeyer 11148, Apr. 1921 (B); id., Bünnemeyer 11365, May 1921 (B); Raoelo near Lombasang, 950 m, Bünnemeyer 11279, May 1921 (B); Boeloe Tanah, wayside, 750 m, Bünnemeyer 11436, May 1921 (B, L); Bonto Leroeng, wayside, 600 m, Bünnemeyer 11789, May 1921 (B, L); Tanette, edge of forest, 400 m, Bünnemeyer 11744, May 1921 (B); Boeloe Parigi, wayside, 560 m, Bünnemeyer 12477, June 1921 (B, U); Pangkadjene, on rocks, Teysmann 11799, 11962, 11967, 12433 (B); id., id., Teysmann 12102 (B, L); Bonthain, Teysmann 13931 (B, L); Tjampalagiang, Rachmat 245, exped. van Vuuren, July 1913 (B); Papang, Rachmat 246, exped. van Vuuren, July 1913 (B); Salajar, thickets, c. 300 m, Docters van Leeuwen 1702 (B, U).

Flores, Mborong, thickets, 100 m, de Voogd 2832, Sept. 1936 (B).

Timor, without precise locality, Riedlé s.n. (P); Spanoghe s.n. (L); Koepang, TEYSMANN s.n. (B); Portuguese Timor, Hato-lia, frequent, Mrs. WALSH 508, July 1929 (B).

MOLUCCAS, Ternate, Foramadiahi, thickets, c. 300 m, BEGUIN 1620, May 1921 (B); Boeroe, Leksoela, c. 25 m, TOXOPEUS 13, Febr. 1921 (B, L); id., c. 30 m, TOXOPEUS s.n., Aug. 1921 (B, L); Amboina, ROBINSON 1826, July-Nov. 1913 (B, K, L); Kai-islands, JAHERI 278, 307 (B); Klein Kai (according to WARBURG); Timorlaoet, RIEDEL s.n. (K).

PHILIPPINE ISLANDS, according to MERRILL in open grasslands, deserted clearings, and thickets at low altitudes. Without precise locality, LOHER 6580 (BD); Luzon, prov. Laguna, ROBINSON, Bur. of Sc. 9717, Febr. 1910 (B, BD, K, L); id., RAMOS, Bur. of Sc. 22467, March 1915 (B, L, S); id, Mt. Maquiling, MERRILL 6300, Febr. 1909 (BD, L); Negros, Cabancalan, MERRILL 206, Apr. 1910 (U); Palawan, Puerto Princesa, Mt. Pulgar, ELMER 12880, March 1911 (B, BD, K, L, P, U); Taytay, MERRILL 9185, Apr. 1913 (K); Balabac, MANGUBAT, Bur. of Sc. 483, March-Apr. 1906 (B, BD); Paragua, E-wi-ig River, MERRILL 733, Febr. 1903 (BD).

Distribution: From British India and Ceylon to Indo-China, the Malay Peninsula and the Malay Archipelago.

Vernacular names: akar lulang bulu (Malay Peninsula, RIDLEY); ulan raya (Malay Peninsula, BURKILL and HANIFF); areuj kawojang, aroi kawoejang, aroi kawajang (Sund., BACKER, BLUME, BOERLAGE, KOORDERS); ginda pura utan (ginda poera oetan) (Java, BURMAN); katapong (Java, JUNGHUHN); tampar kidang (Jav., Pekalongan, KOORDERS); ojod kotong, katong (Jav., Semarang, KOORDERS); samber kidang (Djapara-Rembang, BEUMÉE); dewoeloe, pos sepoh, soeboeloe (Madur., Besoeki, KOORDERS); rabet boeloe (Kangean Arch., DOMMERS); taradjoe, leaves: obat loeka (Celebes, Tanette, BÜNNEMEYER); tjamboeloe-boeloe (Celebes, Tjampalagiang, RACHMAT); kai-kai mamia (Celebes, Papang, RACHMAT); kalalakmit (Philipp., Sulu language, MERRILL).

Remarks. The outer part of the sepals often wine-red (LÖRZING).

Section 3. **Xanthips** (GRISEB.) HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 112 — *Ipomoea* L. sect. *Xanthips* GRISEB., Fl. Brit. West Ind. Isl. (1864) p. 470.

Flower-buds ovoid, obtuse or subacute; midpetaline bands of the corolla indistinctly limitated, never with dark lines; flowers of moderate size.

12. Merremia umbellata (L.) HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 552; id. in ENGL., Bot. Jahrb. XVIII (1894) p. 114; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; id. in Meded. 's Lands Pl. t. XIX (1898) p. 545; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509;

COOKE, Fl. Bombay II (1905) p. 237; BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 106; MERRILL in Philipp. Journ. Sc. I (1906) Suppl. p. 120; id., Fl. Manila (1912) p. 389; KOORDERS, Exk. fl. Java III (1912) p. 112; KOORD.-SCHUM., Syst. Verz. (1914) p. 110; BOLD., Cat. Hort. Bog. (1914) p. 161; id., Zakfl. Java (1916) n. 836; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 440; GAMBLE, Fl. Pres. Madras V (1923) p. 928; RIDLEY, Fl. Malay Penins. II (1923) p. 459; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 362; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1301; HENDERSON in Gardens' Bull. Str. Settlem. IV (1928) p. 293 — *Convolvulus umbellatus* L., Spec. Plant. (1753) p. 155 — *C. cymosus* DESR. in LAM., Encycl. III (1791) p. 556 — *C. bifidus* VAHL, Symb. Bot. III (1794) p. 30 — *Ipomoea umbellata* G. F. W. MEY., Prim. Fl. Esseq. (1818) p. 99; CHOISY in DC., Prodr. IX (1845) p. 377 — *I. Heynii* R. et S., Syst. IV (1819) p. 237 — *I. Rothii* R. et S., Syst. IV (1819) p. 237 — *I. cymosa* (DESR.) R. et S., Syst. IV (1819) p. 241; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 461; Bot. Reg. (1843) t. 24; CHOISY in DC., Prodr. IX (1845) p. 371; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 613; BENTH., Fl. Austr. IV (1869) p. 423; F.-VILL., Novis App. (1880) p. 141 (not seen); CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 211; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; SCHUM.-HOLLR., Fl. Kaiser Wilh. Land (1889) p. 115 [1]); WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 412; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 108; TRIMEN, Handb. Fl. Ceylon III (1895) p. 219; SCHUM.-LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 516; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1063; id., Compr. Cat. Queensl. Pl. (1909) p. 349; KOORDERS-SCHUM., Syst. Verz. (1910—13) Conv. p. 4; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 251 — *I. bifida* (VAHL) R. et S., Syst. IV (1819) p. 241 — *Convolvulus blandus* ROXB., Fl. Ind. II (1824) p. 70 (not seen); WALL., Cat. (1828) n. 1342; ROXB., Fl. Ind. I (1832) p. 470 — *C. pentagonus* ROXB., Fl. Ind. II (1824) p. 72 (not seen); WALL., Cat. (1828) n. 1343; ROXB., Fl. Ind. I (1832) p. 485 — *C. Rothii* (R. et S.) SPRENG., Syst. I (1825) p. 600 — *Ipomoea cymosa* (DESR.) R. et S. var. *pilosa* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 462; id., in DC., Prodr. IX (1845) p. 371; MIQ., Fl. Ned. Ind. II (1857) p. 613 — *I. cymosa* (DESR.) R. et S. var. *sagittato-angulata* CHOISY l.c. p. 463 — *I. cymosa* (DESR.) R. et S. var. *sagittata* CHOISY in DC., Prodr. IX (1845) p. 371; MIQ., Fl. Ned. Ind.

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[1]) According to WARBURG, 1891, the specimen HOLLRUNG 809 does not belong here.

II (1857) p. 613 — *I. sepiaria* auct., non KOEN.; ZOLL. et MOR., Syst. Verz. (1845—46) p. 51 — *I. modesta* CHOISY in ZOLL., Syst. Verz. 2. Heft (1854) p. 129, 131; MIQ., Fl. Ned. Ind. II (1857) p. 614 — *I. cymosa* (DESR.) R. et S. var. *typica* PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 108 — *Merremia umbellata* (L.) HALL. f. var. *orientalis* HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 132; id. in Bull. Soc. Roy. Bot. Belgique XXXV (1896) p. 270; id. in Bull. Herb. Boiss. V (1897) p. 375, 381; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509; HALL. f. in Bull. Herb. Boiss., sér. 2, I (1901) p. 675; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 306; HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 379; id. in Meded. Rijksherb. Leiden 35 (1918) p. 5; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 509; id., Enum. Philipp. Fl. Pl. III (1923) p. 362; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 516 — *M. cymosa* (DESR.) BAKER and RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 106. Fig. 1, p; fig. 2, A—I.

Stems herbaceous or the older parts woody, the young parts with white milky juice, twining or prostrate and rooting, slender, terete, or slightly striate, covered with a soft pubescence or glabrescent or glabrous, 1—3 m long (BACKER). Leaves petiolate, the petiole with soft short hairs or glabrous, variable in length, 1.5—6 cm; the blade very variable in form and size, 4—12(—16) cm long and 1—6.5(—9) cm broad, ovate, ovate-oblong or oblong, more or less acuminate at the apex with obtuse, mucronulate point, more or less cordate at the base or rounded to truncate, the auricles rounded or angular, occasionally hastate, the lower surface sparsely to very densely covered with short, soft, greyish or whitish hairs, the upper surface mostly less densely hairy to glabrous; lateral nerves 5—7(—9) on each side of the midrib, tertiary nerves many, subparallel. Inflorescences axillary, the peduncle generally short, 1—4 (rarely to 7 cm) long, mostly densely pubescent, mostly cymosely branched at the top with short to very short branches; flowers mostly in few- to many-flowered umbelliform cymes, rarely solitary; bracts minute, lanceolate, deciduous; pedicels mostly longer than the calyx, sparsely pubescent to glabrous. Flower-buds ovoid, obtuse or acutish. Sepals slightly unequal, the outer ones somewhat shorter than the inner or subequal, very concave, broad-elliptic or orbicular, emarginate, mucronulate, the inner ones scarious at their margin, 5—7(—8) mm long, glabrous or the outer ones sparsely pilose, often pectinately erose and slightly enlarged in fruit. Corolla funnel-shaped, slightly lobed, white or yellowish to orange (see Remarks), 2—3, sometimes to 3.5 cm long, glabrous except the upper parts of the midpetaline bands. Filaments inserted about 5 mm above the corolla base, unequal, short; anthers straight, sagittate. Disk slightly 5-lobed. Ovary conical, glabrous or with some hairs at the top, style glabrous. Capsule ovoid to conical, mucronulate by the base of the style, glabrous or with some hairs at the top, 10—12 mm high, c. 8 mm in diam., 4-valved, the valves lanceolate to narrow-ovate, splitting from the base, 4- or less-seeded; seeds c. 5 mm long, densely hairy with long, soft, patent hairs.

MALAY PENINSULA, according to RIDLEY common in thickets in open country, marshy ground. Perlis, Gua Nangka, HENDERSON, Singapore Field n. 23071, Nov. 1929 (S, mixed with *Jacquemontia paniculata* (BURM.f.) HALL.f.); prov. Wellesley, Tasek Gelugor, RIDLEY s.n., Dec. 1895 (S); Muda River, "common about villages everywhere in the north of prov. Wellesley", BURKILL 3072 (S); Penang, WALLICH s.n. (S); WALLICH 1343 (K); Bukit Padie, CURTIS 1083, Oct. 1886 (K, S); cultivated in the Botanic Gardens, MD. NUR s.n., May 1919 (S); Dindings, RIDLEY s.n., March 1896 (S); Perak, CANTLEY? s.n. (S); Kuala Kangsar, RIDLEY s.n., March 1892 (S); Taiping, RIDLEY s.n., Febr. 1892 (S); id., HENDERSON, Singapore Field n. 10245, Jan. 1923 (S); Lahat, RIDLEY s.n., Febr. 1890 (S); Ipoh, CURTIS s.n., Dec. 1895 (S); Pahang, Pekan, RIDLEY s.n., Aug. 1891 (S); Lubok Paku, Pahang River, BURKILL and HANIFF, Singapore Field n. 16106, Nov. 1924 (S); Kuala Lipis, BURKILL and HANIFF, Singapore Field n. 15702, Nov. 1924 (S); Budu, BURKILL and HANIFF, Singapore Field n. 15808, Nov. 1924 (S); Negri Sembilan, S. base of Tampin hill, BURKILL, Singapore Field n. 1445, Jan. 1916 (S); Tampin, on Kuala Pitah road, BURKILL, Singapore Field n. 2806, Nov. 1917 (S); Selangor, GOODENOUGH s.n., March 1899 (S); Kuala Lumpur, RIDLEY s.n., Dec. 1920 (K); Klang, secundary jungle, FOX s.n., Dec. 1888 (S); Malacca, MAINGAY 1149 (in K also numbered 2966), Febr. 1868 (K, L); ALVINS 62 (S); Belimbing, BURKILL, Singapore Field n. 2802, Nov. 1917 (S); Chinana Puteh, ALVINS 849, Febr. 1885 (S); Kesang Batu, HERVEY s.n., Sept. 1890 (S); Johore, Bukit Muar, FEILDING s.n. (S); Kota Tinggi, RIDLEY s.n., Dec. 1892 (S); Singapore, Sepoy Lines, RIDLEY 11956, Febr. 1904 (S).

SUMATRA, without precise locality, KORTHALS 232 (L); DIEPENHORST? 1345HB (B); Atjeh and Dependencies, P. Breuëh (P. Bras), LEHMANN 19, Dec. 1889 (BD); valley Aloer Lampahan, secondary forest, wayside, VAN STEENIS 6073, Aug. 1934 (B); East Coast, Upper Bilaplain, Aek-boero, thickets and young forest, rather frequent, c. 80 m, LÖRZING 9578, Apr. 1923 (B); Aek-boero, young forest, not rare, c. 80 m, LÖRZING 9638, Apr. 1923 (B); Pematangsiantar, 750 m, WINCKEL 12312, Febr. 1923 (B); valley of Betimoes, near Doerian-tani, N. of Sibolangit, thickets, c. 350 m, LÖRZING 10190, Febr. 1924 (B); N.W. of Medan, thickets and grasslands, sunny places, frequent, c. 16—18 m, LÖRZING 3698, Apr. 1915 (B); Gedong djohore, S. of Medan, thickets and grasslands, not rare, c. 50 m, LÖRZING 3530, 3572, Febr. 1915 (B); Haboko estate, wayside, c. 150 m, DOCTERS VAN LEEUWEN 3184, Febr. 1919 (B); id., DOCTERS VAN LEEUWEN 3185, Febr. 1919 (B, L); Tapanoeli, Nias, VON RÖMER XI (B); id., VON RÖMER XVII (B, mixed with *Merremia peltata* (L.) MERRILL); West Coast, Ophir district, mountain-ridge S.W. of Taloe, edge of forest, common, 800 m, BÜNNEMEYER 135, Apr. 1917 (B); Pi Nagar, wayside, forest, c. 210 m, BÜNNEMEYER 238, Apr. 1917 (B); Talakmau, W. slope, common, BÜNNEMEYER 336, Apr. 1917 (B); id., 350 m, BÜNNEMEYER 337, Apr. 1917 (B); Padang, KORTHALS 232 (L); Ajer mantjoer, c. 360 m, BECCARI 720, Aug. 1878 (K, L); Pariaman, DIEPENHORST? 2131 H. B. (B); Padangpandjang, MATTHEW s.n., Jan. 1913 (K); Tjoebadah, thickets, common, 700 m, BÜNNEMEYER 72, Apr. 1917 (B); G. Malintang, N.W. slope, edge of forest, frequent, c. 1100 m, BÜNNEMEYER 3505, July 1918 (B, L, S, U); Kerintji, Kp. Baroe, wayside, 850 m, BÜNNEMEYER 8054, Febr. 1920 (B); Kerintji, Ajer Anim, thickets, wayside, 900 m, BÜNNEMEYER 7998, Febr. 1920 (B, L, S); lake of Kerintji, wayside, 800 m, BÜNNEMEYER 8302, Febr. 1920 (B); Seolak Dras, 3000 ft, ROBINSON and KLOSS s.n., March 1914 (K); Sanggaranagoeng, 2450 ft, ROBINSON and KLOSS s.n., May 1914 (K); Benkoelen, Benkoelen, 5 m, AJOEB 29, expedition JACOBSON, June 1916 (B); Enggano, Meok, edge of forest, thickets, LÜTJEHARMS 3838C, May 1936 (L); Lampoengs, Kota agoeng, CRAMER 121, 122, Aug. 1915 (B); Palembang, Palembang, PRAETORIUS 163 (L); Martapoera, alang field, BAL 29, Febr. 1930 (B); id., BAL 51, Febr. 1930 (B); Djambi, Bangko, wayside, sunny place, 60 m, POSTHUMUS 485, July 1925 (B, L, S); Doesoen Baroe, forest, c. 200 m, POSTHUMUS 878, Sept. 1925 (B; L, mixed with *Merremia tridentata* (L.) HALL.f. ssp. *hastata* (DESR.) VAN OOSTSTR.; U); id., edge of forest, c. 200 m, POSTHUMUS 887, Sept. 1925 (B); Bangka and Dependencies, Toboali, Bentja, common, 90 m, BÜNNEMEYER 2237, Dec. 1917 (B).

JAVA, according to BACKER from West to East Java, in the lowlands and the lower mountainous region, in hedges, thickets, along edges of forests. Without precise locality, BLUME 42 (L); HILLEBRAND s.n. (BD); HORSFIELD s.n. (L, U); HORSFIELD, Conv. 4 (K); KORTHALS 233 (L); MILLET s.n. (K); PLOEM s.n. (B); PLOEM 208 (BD); REINWARDT s.n. (L); ZOLLINGER 119 (BD, K, L); Bantam, Prinseneiland, KEULEMANS s.n. (L); between Sadjira and Lebak, KUHL and VAN HASSELT 281, Aug. (L); Rangkasbitoeng, thickets, frequent, 50 m, BACKER 1086, June 1911 (B); between Rangkasbitoeng and Tjileles, thickets, frequent, 50—130 m, BACKER 1125, June 1911 (B); Pasir Ajoenan, 150—200 m, BACKER 1944, June 1911 (B, mixed with *Bonamia semidigyna* (ROXB.) HALL.f.); Tjibioek estate, Pandeglang, VELDERS s.n., July 1922 (B); Bodjongmanik, KOORDERS 40789 β, June 1912 (B, L); id., G. Liman, KOORDERS 40926 β, June 1912 (B); G. Kantjana, KOORDERS 41205 β, June 1912 (B); id., KOORDERS 41401 β (B, L); Batavia, Batavia, PIEPERS s.n. (B); between Weltevreden and Batavia, thickets on riverbank, c. 5 m, BACKER 33291, Aug. 1902 (B); Laanhof, S.W. of Weltevreden, hedges, 15 m, BACKER 33290, July 1902 (B); S.W. of Pesing, grasslands, thickets, hedges, frequent, BACKER 33293, Febr. 1905 (B); Meester Cornelis, thickets, hedges, 20 m, BACKER 33292, July 1903 (B); Bidara tjina, S. of Meester Cornelis, 20—25 m, EDELING? s.n. (B); ZOLLINGER 1452, *type of Ipomoea modesta* CHOISY (= *I. sepiaria* auct., non KOEN.) (BD); Tjikoempaj estate, E. of Poerwakarta, c. 110 m, HARMSEN 32, Aug. 1921 (B); Wanajasa, S. of Poerwakarta, waste places, wayside, frequent, 600 m, BAKHUIZEN VAN DEN BRINK 4812, July 1920 (B, L); Krawang, Tjikampek, teak-wood, 50 m, BEUMÉE 4553, Nov. 1919 (B); Buitenzorg, Depok, c. 90 m, KOORDERS 31153 β (prob. var. *occidentalis*), Sept. 1898 (B); id., KOORDERS 31154 β, Aug. or Sept. 1898 (B, L); id., KOORDERS 44005 β, June 1917 (B); id., forest, KOORDERS 44072 β, July 1918 (B); id., SOEGADIREDJA 277, May 1900 (B); id., SMITH and RANT 685, Oct. 1911 (B); Buitenzorg, KUHL and VAN HASSELT 55, 74, 75, 78 (L); cultivated in the Botanic Garden, n. XV. H. 4; XV. H. 4a (var. *occidentalis*); XV. H. 7; XV. H. 7a (B); id., HALLIER C. 163a, Aug. 1894 (L); id., HALLIER D. 206a and D. 206b, May and July 1893 (B); banks of

Tjiliwoeng near Buitenzorg, HALLIER 206b and 206c, Apr. 1893 (B); Waroeng Mangga, 250 m, HALLIER 206a, May 1893 (B); Panaragan, wayside, c. 230 m, VAN STEENIS 5455, July 1933 (B); Kota Batoe, c. 350 m, SOEGADIREDJA 180, Apr. 1900 (B); way to Tjilaboet, frequent, 200 m, BAKHUIZEN VAN DEN BRINK 2359, Aug. 1919 (B); Batoe toelis, without collector's name n. 286 (L); near Tjampea, KUHL and VAN HASSELT 84 (L); id., frequent, 500 m, BAKHUIZEN VAN DEN BRINK 1153, Sept. 1916 (B); S. of Leuwiliang, thickets, frequent, c. 400 m, BACKER 26003, Sept. 1918 (B); Tjinaroea, Tjibodas, RAAP 912, July 1894 (L); G. Salak, N.W.-slope near G. Boender, thickets, c. 750 m, BACKER 33289, Aug. 1909 (B, L); Tjidadap, S. of Tjibeber, waste places and edge of forest, 1000 m, BAKHUIZEN VAN DEN BRINK 2876, March 1917 (B); Tjidasmalang near Tjidadap, forest, frequent, 1000 m, WINCKEL 1830β, Nov. 1923 (B, L); Batoe Karoet, Tjidadap, forest, frequent, WINCKEL 392β, July 1919 (B, L, U); G. Boeleud, Tjidadap, forest, rather frequent, 1000 m, WINCKEL 1723β, Oct. 1913 (B, L); G. Tjileuer, W. of Buitenzorg, on tree and shrubs, on limestone, 250 m, VAN STEENIS 1729, July 1928 (B); Tjileboet, BOERLAGE s.n., Oct. 1888 (L); S. of Tjipetir, on shrubs, c. 500 m, WISSE 891, Aug. 1922 (B); Tjibadak, grassy slopes, frequent, 400 m, BACKER 25664, Aug. 1918 (B); Tjiagrek, S. of Batoetoelis, thickets, frequent, c. 450 m, BACKER 33288, June 1910 (B); Takokak, 1000 m, KOORDERS 15031β, Febr. 1894 (B); Palaboehan, young forest, 50 m, KOORDERS 34667β, Apr. 1899 (B); Palaboehanratoe, BOERLAGE s.n., July (L); S. of Djasinga, hills, thickets and young second. forest, frequent, 200 m, BACKER 23467, Febr. 1918 (B); Lengkong, thickets, frequent, 600 m, BACKER 17102, Nov. 1914 (B); G. Boerangrang, N.W.-slope, edge of forest, 1000 m, BACKER 14258, June 1914 (B); N. of Soekaboemi, thickets, BACKER 14782, July 1914 (B); Priangan, PLOEM s.n. (L); Bandoeng, VAN DER VEEN s.n., herb. v. O. 7248, Sept. 1923 (L); N. and N.E. of Bandjar, thickets, frequent, 50 m, BACKER 4652, Sept. 1912 (B); G. Sawal, S. slope above Tjikoneng, sunny thickets, 550 m, BACKER 8460, Aug. 1913 (B); between Radjamandala and Tjipeujeum, in grass, 300 m, BACKER 13445, May 1914 (B); Nanggerang, S.W. of Tasikmalaja, second. thickets, frequent, 900—1000 m, BACKER 8774, Aug. 1913 (B); Noesagede, lake of Pandjaloe, 720 m, KOORDERS 47917β, July 1917 (B); Cheribon, between Haoergeulis and Tjipoenegara, 25 m, BACKER 16848, Oct. 1914 (B); Tjibogo, JUNGHUHN 58, June (L); Pekalongan, between Dara and Bandar, thickets, frequent, 300 m, BACKER 15608, Sept. 1914 (B); Soebah, virgin forest, KOORDERS 36864β, May 1899 (B, L); forestry E. Tegal, teak-wood, edge of thickets and clearings, 40 m, BEUMÉE 4387, Sept. 1919 (B); id., in young teak-wood, on marl, 80 m, BEUMÉE 4498, Sept. 1919 (B); Banjoemas, hills between Banjoemas and Mandirantjang, KIEVITS, Banj. 108, Oct. 1923 (Pa); Semarang, sugar factory Tandjong Modjo, KIRIMAN 11 and 15, June 1924 (Pa); Bandoengan, on shrubs, KOOPER 802, Sept. 1932 (B); Daroepana, teak-wood, 100 m, BACKER 16435, Sept. 1914 (B); Weleri, thickets, frequent, 5 m, BACKER 16512, Sept. 1914 (B); Kedoeng djati, virgin forest, KOORDERS 25054β, Sept. 1896 (B, L); id., KOORDERS 28093β, June 1897 (B, L); Oengaran, N. slope, virgin forest, 3—5000 ft, JUNGHUHN s.n. (L); Djapara-Rembang, Ngarengan, teak-wood, 50 m, KOORDERS 35612β, May 1899 (B); id., KOORDERS 35619β, May 1899 (B); Madioen, Madioen, hedge, 60 m, WISSE 23, Sept. 1918 (B); E. of Madioen, bank of dry river, 90 m, WISSE 680, Aug. 1921 (B); Kediri, forestry Krondong, teak-wood, 125 m, GRUTTERINK 3082, July 1918 (B); id., 150 m, DEN BERGER 412, Aug. 1918 (B); G. Pandan, THORENAAR 166, Sept. 1919 (B); Soerabaja, Soerabaja, DORGELO 2094, Sept. 1923 (Pa); Malang, Djatirata, grasslands, c. 25 m, BACKER 7877, May 1919 (B); Tengger, 400 m, BUYSMAN 205 and 209, Aug. 1907 (U); Besoeki, Djember, c. 85 m, ULTÉE 8 (B); G. Idjen, N. slope, above Bajeman, thickets, 500 m, BACKER 24972, June 1918 (B); between Pantjoer and Pradjekan, volcanic, very dry soil, 300 m, KOORDERS 32411 β, Dec. 1898 (B); Poeger, KOORDERS 20930 β, Oct. 1895 (B, L); id., KOORDERS 21457 β, Oct. 1895 (B); id., virgin forest Sading, 10 m, KOORDERS 21080 β, Oct. 1895 (B); Madoera, Kangean-islands, Kangean, Kaë, DOMMERS 78, Sept. 1919 (B).

BORNEO, without precise locality, KOORDERS 126 (L); BARBEY 396 (K); W. division, Sanggau, HALLIER 930 (B, L); Sintang, TEYSMANN 8296 and 8297 (B); Benkajang, frequent, DUNSELMAN 45, July 1936 (B); S. and E. division, Bandjermasin, MOTLEY 231 and 546bis (K); Doesoen, KORTHALS 230 (L); West Koetai near Lahoen, thin second. forest, 15—20 m, ENDERT 1765, June 1925 (B); Hayoep, WINKLER 3381, Sept. 1908 (B, BD, K, L); Pagat, GRABOWSKY s.n. (BD); Long Sele, SCHLECHTER 13529, Aug. 1901 (BD); Sarawak, Kuching, SAHIB s.n. (S); Perkulu Ampat, Sarawak River, HAVILAND b.p.r.m., June 1890 (K, S); Baram district, Baram, HOSE 219, Oct. 1894 (K); Upper Baram, Lio Matu, MOULTON, Singapore Field n. 6716 (B, K, S); Brooketon, HAVILAND 1449, e.e.c. (K).

CELEBES, Celebes and Dependencies, Sirondjong near Lombasang, 900 m, BÜNNEMEYER 11559, May 1921 (B, L); Boeloe Parigi near Tanette, wayside, 560 m, BÜNNEMEYER 12476, June 1921 (B, L); Tjampaga, RACHMAT 161, exped. VAN VUUREN, July 1913 (B); Tawanga, Sangona, KJELLBERG 976, March 1929 (B); Kendari, KJELLBERG 550, Febr. 1929 (B); Kabaëna isl., Balo, Eempoehoe, 0—200 m, ELBERT 3325, Oct. 1909 (L); Manado, according to HALLIER, 1898, in young thin forest; Manado, KOORDERS 16545 β, Apr. 1895 (B, L); Sonder, young forest, 600 m, KOORDERS 16544 β, May 1895 (B, BD, L); Amoerang, KOORDERS 16546 β, March 1895 (B); Tonsawang, KOORDERS 16547 β, March 1895 (B); between Manado and Tomohon, rather frequent, 300 m, KOORDERS 16548 β, Jan. 1895 (B, BD, K, L); Manado, way to Boeha, KOORDERS 16549 β, Jan. 1895 (B, L).

FLORES, Sita, edge of mountain forest, frequent, 600—800 m, Mrs. RENSCH 1373, June 1927 (BD); Mborong, thickets, 100 m, DE VOOGD 2833, Sept. 1936 (B).

TIMOR, without precise locality, ZIPPELIUS 33/b, named *Convolvulus tomentellus* ZIPP. (L); id., without collector's name (L).

WETAR, S. coast, Ilmedo, *Eucalyptus*-savannah, 0—50 m, ELBERT 4688, March 1910 (L).

MOLUCCAS, Ternate, Foramadiati, thickets, c. 400 m, BEGUIN 1115, Nov. 1920 (B); Boeroe, Kajeli, BOERLAGE 558, Aug. 1900 (B); Ceram, P. Boano, KORNASSI 1309, May 1918 (B); W. Ceram, Loki, coast vegetation, KORNASSI 1197, May 1918 (B); Wai Riocapa, 50 m, RUTTEN 1611, Sept. 1918 (B, L, U); N.W. Ceram, Wai Kapoetih, virgin forest, RUTTEN 1752, Oct. 1918 (B); S. Ceram, Amahai, TREUB s.n. (B); Ceramlaoet, (according to WARBURG, 1891); Amboina, TEYSMANN s.n. (B); ROBINSON, Pl. Rumph. Amboin. 404, July-Nov. 1913 (B, L); Alang, BOERLAGE 512, July 1900 (B); Asiloeloe, BOERLAGE 353, July 1900 (B); G. Nona, BOERLAGE 110, July 1900 (B); Soja di bawa, TREUB s.n. (B); Hila, TREUB s.n. (B); Koeboeran Tjenkeh near Batoemerah, RANT 801, Nov. 1931 (B); Kampong Ema, 200—400 m, KORNASSI 1141, Apr. 1918 (B, L); Kai-islands, JAHERI 306 (B); Timorlaoet, RIEDEL s.n. (K).

NEW GUINEA, Territory of New Guinea, MAILANDER 26, Sept. 1913 (BD); Bismarck Mountains, Ramu River, RODATZ & KLINK 234, July 1899 (BD); id., alang fields, 180 m, LAUTERBACH 2730, Sept. 1896 (BD); Erima, near Stephansort, beach, LEWANDOWSKY 13, Aug. 1899 (BD, L); Sepik River, Malu, LEDERMANN 7958, July 1912 (BD); Papua, Koitaki, open savannah land, climbing up grasses, etc., c. 1500 ft, CARR 12850, July 1935 (L); Lake Daviumbu, Middle Fly River, in second. growth rain-forest, common, BRASS 7720, Sept. 1936 (L); id., rain-forest clearings, common, BRASS 7729, Sept. 1936 (L).

BISMARCK ARCHIPELAGO, New Britain (N. Pommern), Gazelle Peninsula, LAUTERBACH 291, May 1890 (according to SCHUMANN & LAUTERBACH).

PHILIPPINE ISLANDS, according to MERRILL throughout the Philippines in thickets at low and medium altitudes, usually common. Luzon, Central Luzon, LOHER 4133 (K); prov. Benguet, Baguio, ELMER 8920, March 1907 (B, K, L); prov. Isabela, San Mariano, RAMOS and EDAÑO, Bur. of Sc. 46901, Febr.-March 1926 (S); prov. Nueva Vizcaya, vicinity of Dupax, MCGREGOR, Bur. of Sc. 11398, March-Apr. 1912 (L); prov. Rizal, Manila, PERROTTET s.n. (L); id., VIDAL 3343, March 1886 (K); id., MERRILL 2048, Dec. 1913 (B, BD, L, S); id., MERRILL 7403, Nov.-Dec. 1910 (L); id., RODBERTUS s.n. (BD); Antipolo, MERRILL 93, Jan. 1910 (U); Montalban, LOHER 4131, Febr. 1891 (K); San Francisco del Monte, LOHER 4132, Febr. 1891 (K); San Mateo, VIDAL 477, Oct. 1883 (K, L); Novaliches, Rio Tangeo, LOHER 4130, Febr. 1891 (K); Culion, open dry soil, MERRILL 447, Dec. 1902 (BD, K); Palawan, Brooks Point, Addison Peak, ELMER 12603, Febr. 1911 (B, BD, K, L, U); Isl. of Paragua, Point Separation, in open thickets, MERRILL 827, Febr. 1903 (BD, K).

Distribution: Tropical East Africa, Seychelles, British India, Ceylon, eastwards to China and Indo-China, Malay Peninsula, Malay Archipelago, Philippines, New Guinea and Queensland; the var. *occidentalis* HALL. f. in America from Mexico to Paraguay, West India, tropical West Africa.

Vernacular names: akar bungah koning (Mal. Peninsula, Selangor, GOODENOUGH); akar lakoon (Mal. Peninsula, Selangor, FOX); akar liha patong, akar ulan bitina (Mal. Peninsula, Malacca, ALVINS); akar kalimpanan, akar mantjie (Sumatra, DIEPENHORST?); andoer nasi (Mal.: Tobabatak, Sumatra, LÖRZING); oebi-oebi (Sumatra, W. coast, DIEPENHORST); akar boeloe (Sumatra, W. coast, BÜNNEMEYER); akar slemang (Sumatra, Palembang, PRAETORIUS); bajoe seloeang, akar seloeang (Sumatra, Palembang, BAL); akaboeloe, akar itang (Sumatra, Djambi, POSTHUMUS); akar biabak (Bangka, BÜNNEMEYER); areuj kidang (Sund.: Java, BACKER, HEYNE); areuj reteu, areuj reuteun (Sund.: Java, Bantam, KOORDERS); ojod kedangan, ojot kidangan (Mal.: Java, Buitenzorg, KOORDERS); areuj jeuteum (Sund.: Java, Buitenzorg, BAKHUIZEN VAN DEN BRINK); tatapajan (Sund.: Java, Buitenzorg, RAAP); areuj geureung (Sund.: Buitenzorg, BACKER, KOORDERS); areuj boeloe (Java, Buitenzorg, BOERLAGE); kotong?, tamparkidang? (Jav.: Java, Djapara-Rembang, KOORDERS); lawatan kebo (Jav.: Java, Kediri, THORENAAR); waroengan (Jav.: Java, Besoeki, KOORDERS); rabet saobi sabbian (Kangean-islands, Dommers); akar endit (Borneo, Koetai-language, Endert); ampas-ampas (Celebes, Makassar, Miquel); pala parang (Celebes, Heyne, Rachmat); rongo (Celebes, Heyne), oewi-im-pager (Celebes, Tontemboan language, Koorders); katama (Celebes, Tomboeloe-language, Koorders); timbohoe koesoe (Celebes, Bantik language, Koorders); petatas oetan (Ambon, Kornassi); daoen bisoel, daoen bissol (Moluccas, Miquel); maboka (New Guinea, Terr. of N. Guinea, Mailander); bangbañgau (Philipp.: Ilóko language, Merrill); kalamitmit (Philipp.: Tagbanúa language, Merrill); kamokamotíhan (Philipp.: Pampángan language, Tagálog language, Merrill); malakamóte (Philipp.: Pampángan language, Merrill); tukod-tukod (Philipp.: Panay Bisáya language, Merrill).

Use: See Heyne, Nutt. Pl. ed. 2 (1927) p. 1301.

Remarks. 1. The specimens from Malaysia belong to var. *orientalis* Hall. f., with the exception of one or two sheets, representing var. *occidentalis* Hall. f. (a specimen from Depok (Buitenzorg), Koorders 31153 β; a specimen from Prinseneiland, Keulemans s.n.). Hallier (1894) writes about the two varieties as follows: "von der indischen Form unterscheidet sich die amerikanische nur durch üppigeren Wuchs, grössere, breitere und typisch herzförmige Blätter, reichere und länger gestielte Blütenstände und angeblich gelbe Blüten". In 1896 (in Bull. Soc. Roy. Bot. Belgique XXXV, 1896, p. 270) he again gives the differences between the two varieties and here the description of var. *occidentalis* reads: "Tota planta robustior quam var. β orientalis Hallier f. (*Ip. cymosa* R. et Sch.), glabrescens, laetius viridis; caulis senior lignescens; folia majora et longiora quam in var. β orientali, longe cordiformia, forma Calystegiam imitantia, basi profundius angustiusque sinuata, lobis basalibus oblongis, saepe subsagittatis, adulta utrinque glabra, nitidula, laetius viridia; flores subumbellati; pedunculi glabrescentes; pedicelli glabri, fere una ex pedunculi apice nati; alabastra et corollae multo majores quam in var. β orientalis speciminibus in Archipelago Malayo-Papuano collectis (sed non omnibus ex India anglica); sepala glabra; corolla saturate sulfurea; corollae fasciae 5 mesopetalae extus apice pilis minutissimis vix conspicuis sparse obsiti. In speciminibus validioribus petioli ultra 3 dm. longi, folii lamina usque 2 dm. longa et 17 cm. lata."

Moreover, the American specimens have, as far as I can see the capsule subglobose instead of ovoid to conical with broader, ovate valves and the seeds not so long villose, but pubescent to short tomentose and only with slightly longer hairs at the margin (such seeds are found in the Leiden Herbarium in the specimens MERCEDES CHANEK 130 and 131, from British Honduras, El Cayo and vicinity, March-June 1933). See fig. 1, r. According to the description in my paper on the Convolvulaceae of Surinam (in PULLE, Flora of Surinam, IV, p. 81), the seeds of the Surinam specimens are softly pubescent. In MARTIUS's Flora Brasiliensis the capsule is described as subglobose and the seeds as "fusco-velutina, margine breviter villosa". The sepals of the American materials are usually longer than is found in the Malaysian specimens, they have a length of 7—10 mm, whereas in Malaysia they are 5—7, sometimes to 8 mm long. The colour of the flower of American specimens is yellow; the majority of the specimens in the eastern part of Malaysia has white flowers, completely or partly yellow ones are, however, not rare in the western part of the region. According to some label-notes the corolla is yellow, dull orange-yellow, pale yellow, salmon yellow, rarely white (Malay Peninsula), cream, pale yellow (Atjeh), yellow, bright yellow, whitish with yellow throat or white (E. coast of Sumatra), white to pale orange, pale orange, pale orange-yellow or white (W. coast of Sumatra), white (Nias), white (Benkoelen); yellow (Djambi); white (Bangka), white (the majority of the specimens from Java, with exception of some numbers collected near Buitenzorg, with pale yellow or whitish yellow flowers), white with yellow centre (W. Borneo, S. and E. Borneo), white (Sarawak, N. Borneo); white (Celebes, Moluccas, Lesser Sunda Islands, New Guinea, Philippines).

In *Merremia peltata* (L.) MERRILL we have a remarkable parallelism to this species as to the colour of the corolla, for in that species the majority of the specimens in the western part of Malaysia has yellow flowers (Malay Peninsula; Sumatra, with exception of a specimen from Simaloer; Java, Borneo, with exception of some specimens from British North Borneo; Celebes) whereas in the Moluccas, New Guinea and more eastwards the corolla seems to be constantly white.

2. The specimen KOORDERS 31153 β from Depok (Buitenzorg, Java) has subglobose 4-valved capsules, c. 15 mm in diam. with broad ovate valves; the seeds are 6 mm long, densely tomentose, with slightly longer hairs at the margin (perhaps belonging to var. *occidentalis*).

Section 4. **Hailale** HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XLIX (1913) p. 379.

Closely related to section *Xanthips*; flower-buds ovoid or narrow-ovoid, acute or acutish, rarely subglobular, the midpetaline bands of the corolla not with distinct dark lines; inflorescences corymbose, often forming terminal panicles, the lower bracts often foliaceous; flowers of moderate size or large. Generally large woody climbers.

13. **Merremia Boisiana** (GAGNEP.) VAN OOSTSTR., nov. comb. — *Ipomoea Boisiana* GAGNEP. in Notul. System. III (1914) p. 141; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine, IV (1915) p. 263[1]).

A large woody climber, the branches terete or slightly striate, fistulose, glabrous, dark greyish brown or brownish-black, to 5 mm in diam. in the type specimen, the leaves petiolate, petiole glabrous or very sparsely pubescent near the top, to 7 cm long, blade broad-ovate to orbicular, acuminate to cuspidate at the apex, broadly cordate at the base, 8—14 cm long, 7—12 cm broad, quite glabrous, paler beneath than above, in the type glaucous beneath, midrib and 8—9 pairs of lateral nerves prominent beneath, slightly impressed above, secondary nerves parallel, prominulous beneath, slightly impressed above, tertiary nervation finely reticulate, prominulous above. Inflorescences axillary, 12—21 cm long, corymbosely ramified at the apex, several-flowered, the peduncle terete in the basal part and glabrous, more or less applanate above and pubescent, 9—13 cm long; the branches slightly pubescent, the lower ones 4—2.5 cm long; bracts minute, narrow-triangular, 1—1.5 mm long, deciduous, or the lower ones sometimes foliaceous; pedicels to 8(—12) mm long, sparsely pubescent, slightly thickened towards the calyx; the flower-buds subglobular. Sepals subequal in length or the outer ones slightly shorter, 5—7 mm long, concave, glabrous or the exterior ones slightly pubescent especially near the base, the exterior ones orbicular or transverse elliptic, broadly obtuse or slightly retuse at the apex, the interior ones broadly transverse elliptic; the corolla yellow (BOIS), broadly funnel-shaped to campanulate, circ. 22 mm long, the limb hardly lobed, the midpetaline bands densely sericeous outside; filaments inserted about 3—3.5 mm above the corolla base, 3—5 mm long, curved at the dilated, papillose base; the corolla with two longitudinal hair lines below the place of insertion of each filament; anthers straight, later on spirally twisted; disk small; ovary conical, glabrous, style about 9—10 mm long, glabrous, stigmas globular, papillose. Capsule (according to GAGNEPAIN) glabrous, 4-valved, ovate-conical, castaneous at the base, yellow upwards.

SUMATRA, East Coast, without precise locality, YATES 975 (K).

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[1]) A related species is **Merremia Bimbim** (GAGNEP.) VAN OOSTSTR., nov. comb. (*Ipomoea Bimbim* GAGNEP. in Notul. System. III (1914) p. 140; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 247) Type: BON 2700, Tonkin, prov. Hanoï, near Vo-xa (P).

Distribution: Indo-China, Sumatra.

Remarks. The specimen collected by YATES in Sumatra is almost entirely identical with the type of *Ipomoea Boisiana* GAGNEP. from Tonkin (BOIS 138) in the Paris herbarium. Only the lower surface of the leaves of the Tonkin specimen is somewhat more glaucous than in that from Sumatra. The specimen BECCARI 3594 from Borneo, mentioned by GAGNEPAIN under *Ipomoea Boisiana* most probably belongs to *Merremia crassinervia* VAN OOSTSTR.

var. **fulvopilosa** (GAGNEP.) VAN OOSTSTR. — *Ipomoea Boisiana* GAGNEP. var. *fulvopilosa* GAGNEP. in Notul. System. III (1914) p. 142 — *I. Boisiana* GAGNEP. var. *rufopilosa* GAGNEP. in LEC., Fl. Indo-Chine IV (1915) p. 263.

The stems, the peduncles and their branches, the petioles and the lower surface of the leaves densely rufous pilose to tomentose; the upper surface of the leaves is more sparsely pilose; the pedicels are rufous pilose in the basal part, for the rest glabrous, the sepals are glabrous, except some hairs near the base; the corolla has the same densely sericeous midpetaline bands as the typical form of the species. The branches of the inflorescences are shorter than in the typical form and are more crowded.

Type: BON 4801, Tonkin, region of Lac-thô.

Distribution: Tonkin.

var. **sumatrana** VAN OOSTSTR., nov. var.

Differt ramis, pedunculis petiolisque cinereo vel fulvo pubescentibus, glabrescentibus, foliis subtus dense griseo-pubescentibus, pallidioribus, supra primo dense, deinde sparse pubescentibus, glabrescentibus; pedicellis cinereo- vel fulvo-pubescentibus, sepalis glabris vel exterioribus basin versus subpubescentibus.

SUMATRA, East Coast, Sibolangit, nature reserve, common in thickets and in young, rarely in old forest, c. 500 m, LÖRZING 4723, Febr. 1917 (B; L, *type*); S. of Sibolangit, common in young forests and thickets, c. 600 m, LÖRZING 4234, Febr. 1916 (B).

Distribution: Sumatra.

Remarks. 1. According to the field notes the specimens collected by LÖRZING are large woody climbers, to 20 m high, covering whole trees. The nerves of the leaves and the petioles are reddish or reddish brown; the flowers are white. An old branch on the type sheet in Leiden with the fruits fallen off, has still persisting calyces; they are slightly enlarged.

2. This variety differs from typical *Merremia Boisiana* by the characteristics given above. It much resembles var. *fulvopilosa* GAGNEP.;

the indument is, however, of a different kind; in var. *fulvopilosa* the hairs are much longer, and rufous (rather than fulvous), whereas in the new variety they are much shorter, less dense and more greyish. In the specimen Lörzing 4234 the larger leaves have a length of 20 cm and a width of 16 cm with a petiole of 10 cm; the inflorescence have a length of 8—16 cm.

14. **Merremia mammosa** (Lour.) Hall. f. in Teysmannia VII (1897) p. 164; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 509; Koorders, Exk. fl. Java III (1912) p. 113; Koord.-Schum., Syst. Verz. (1910—13), Conv. p. 3; Heyne, Nutt. Pl. ed. 2 (1927) p. 1299; Koolhaas in Ann. Jard. Bot. Buitenz. XLV (1938) p. 182 — *Convolvulus mammosus* Lour., Fl. Cochinch. I (1790) p. 108 — *Ipomoea mammosa* (Lour.) Choisy in Mém. Soc. Phys. Genève VI (1833) p. 475; id. in DC., Prodr. IX (1845) p. 389; Miq., Fl. Ned. Ind. II (1857) p. 620; Vorderman in Tijdschr. Inl. Geneesk. IV, 1 (1896) p. 4; Costerus and Smith in Ann. Jard. Bot. Buitenz. XIX (1904) p. 159, pl. XXIII, fig. 67 (teratology) — *I. Gomezii* Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 211 (according to Hallier).

Subterraneous parts tuberous, tubers fusiform, fasciculate, 6—7 together, c. 25 cm long, with white milky juice; stems annual, twining, quite glabrous as is the whole plant, terete, brown, finely striate in the older parts, to 5 mm in diam. Leaves petiolate, petiole slender, to 6, sometimes to 10 cm or more long; blade broad-ovate to orbicular or sometimes broader than long, abruptly acuminate with narrow, obtuse, mucronulate acumen, the base cordate with a more or less deep, broad sinus, the margin entire or somewhat undulate; length of blade 6—12 cm, width 4.5—12 cm, sometimes to 15 cm; lateral nerves 7—9 pairs, 3 or 4 pairs of them from near the base; secondary nerves many, parallel; tertiary nervation reticulate. Inflorescences axillary, the peduncle terete or slightly angular above, from 3 to 15 cm long, with 1—3, sometimes with more flowers; pedicels thickened and angular above, 12—15 mm long, bracts linear-lanceolate or lanceolate, membranous, 7—10 mm, caducous. Flower-buds narrow-ovoid, acute. Sepals large, concave, the 3 exterior ones broad-ovate to broad-elliptic, obtuse, minutely mucronate, the inner ones narrower and less obtuse, all of about the same length, 24—30 mm long. Corolla white, 7—8 cm long, broadly funnel-shaped, contracted at the base into a short tube; the limb glabrous but with minute punctiform glands outside; midpetaline bands distinctly veined. Filaments 7—8 mm long, inserted about 10 mm above the corolla base, the base of the filaments decurrent with a row of hairs on each side; anthers spirally twisted. Disk annular. Ovary glabrous; style glabrous, c. 20 mm long, with 2 free globular stigmas. Capsule enclosed by the persistent calyx. Seeds 8 mm long, greyish to black with long brownish hairs along the margins, hairs to 8 mm long.

JAVA, Batavia, Laanhof, S.W. of Weltevreden, cultivated in native garden, BACKER 33473, April 1904 (B, L, U); Buitenzorg, cultivated in the Botanic Garden at Buitenzorg n. XV. H 13, 38 and 38A (according to HALLIER, 1896); id., HALLIER 164a and c, May 1895 (L); Batoctoelis, cultivated, KOORDERS 40296 β, Aug. 1910 (B); Tjigombong, cultivated, KOORDERS 44053β, July 1900 (B); Pekalongan, sugar factory Tirto, DOCTERS VAN LEEUWEN s.n., Apr. 1911 (B); Madoera, hills S.W. of Rapa, spontaneous, 150 m, BACKER 20249, March 1915 (B).

Distribution: British India, Indo-China, Andamans, Philippine Islands (?); cultivated in Java, especially in the Principalities (VORDERMAN), but also in other parts of the island, formerly also in Bali and in the Moluccas (according to RUMPHIUS; see Remarks); probably occasionally escaped from culture (Madoera?).

Vernacular names: bidara oepas (Mal., KOORDERS, HEYNE, VORDERMAN); widara oepas (Jav., KOORDERS, TEYSMANN, VORDERMAN); wirodjo (Jav., KOORDERS); blanar (Jav., HEYNE); oebi soefoe (Moluccas, MIQUEL, TEYSMANN); bangkoewang, bangcoan (Bali, RUMPHIUS); haylale, hailale (Ambon, RUMPHIUS, HEYNE); angcoa (Philippines, RUMPHIUS).

Use: Used as a native anti-diabetes remedy; also used in affections of the throat and the respiratory organs (HEYNE l.c.) or in cases of lung tuberculosis (VORDERMAN). The tubers are edible.

Remarks: 1. *Merremia mammosa* has been based by HALLIER on *Convolvulus mammosus* LOUR., most probably only on account of LOUREIRO's description. According to LOUREIRO his plant was cultivated in Cochinchina, under the name of Khoai tu. The description given by LOUREIRO is a very short one, but fairly well agrees with the specimens cultivated in Java, which HALLIER named *Merremia mammosa.* As it is impossible to find out what LOUREIRO really understood under his *C. mammosus,* we provisionally accept HALLIER's name for the species described above. LOUREIRO gives Batatta Mammosa RUMPH. as a synonym, and it is evident that he based his name on that given by RUMPHIUS. RUMPHIUS (Herb. Amb. V (1747) p. 370, t. 131) gives an extensive description of the plant, accompanied by a plate. The species is described as a cultivated one, introduced from the Philippines, especially from Mindanao, by the Pampangan people. MERRILL in his "An Interpretation of RUMPHIUS's Herbarium Amboinense", 1917, p. 442—443, gives as his opinion that Batatta mammosa of RUMPHIUS is apparently a composite species, consisting of the stem, leaves and flowers of a Convolvulaceous plant while the tubers are most probably of a *Dioscorea.* The Convolvulaceous plant should be identic with *Operculina Turpethum* (L.) S. MANSO, the only species, as MERRILL says, known from Amboina, which fairly well agrees with RUMPHIUS's plant. It is, indeed, possible that RUMPHIUS meant this species, but with as great a probability we can say that RUMPHIUS's plant was *Merremia mammosa.* MERRILL did not know *Merremia mammosa* from Amboina when writing his publication; he did not even know this species at all. Nor did he most probably know specimens of *Operculina Turpethum* from Amboina. Moreover, RUMPHIUS informs us extensively about the use of his species; *Operculina Turpethum* is as far as I know not used in the Malay Archipelago, neither as a food plant nor as a plant of medicinal use, whereas *Merremia mammosa* played and still plays an important role in native medicine and was at least formerly also eaten. About its Philippine origin I must state that I did not see any materials from these islands. It is, of course, possible that it was cultivated there too in RUMPHIUS's time.

The specimens mentioned above are all cultivated ones with the exception of that from Madoera, where it was collected among bushes in the hills S.W. of Rapa (escaped from culture?).

2. COSTERUS and SMITH l.c. describe and give a figure of a monstrosity of a leaf, a terminal ascidium.

15. **Merremia borneensis** MERRILL in Univ. Calif. Publ. Bot. XV (1929) p. 260.

A large woody climber, quite glabrous, the stems to about 2 cm in diam. (MERRILL), the branches 3—7 mm, terete, fistulose, pale brown to dark brown, warty by pale lenticels. Leaves chartaceous, in dried state dark brown above, paler beneath, opaque above or shining, orbicular, cuspidate with a long and narrow, mucronulate acumen, cordate at the base, 8—22 cm long, 6—18 cm broad, quite glabrous on both sides; midrib prominent beneath, side-nerves curved, prominent beneath, 8—11 on each side, secondary nerves parallel, prominent beneath, tertiary nerves conspicuous, reticulate; petiole black in dried state, striate, 4—11 cm long. Inflorescences several-flowered, 10—25 cm long (MERRILL); peduncles axillary, 6—12 cm long, lenticellate, cymosely branched towards the apex; bracts deciduous; pedicels 1.5—3 cm long, thickened above, especially in fruit, angular. Flower-buds ovoid to oblong, acute. Sepals brown in dried state, elliptic to broad-elliptic, obtuse to slightly emarginate, minutely mucronate, 18—22 mm long, the two outer ones leathery, the inner ones thinner and more or less membranous, all persistent and slightly accrescent in fruit. Corolla yellow, 5.5—6 cm long, campanulate to funnel-shaped, slightly lobed, glabrous outside, inside papillose below the place of insertion of the filaments. Filaments glabrous, to about 2 cm long, inserted about 14 mm above the corolla base. Above the place of insertion of the filaments the corolla has a semicircular thickening inside. Ovary ovoid, glabrous, 4-celled; style filiform, about 3 cm long (MERRILL); capsule ovoid, mucronate, glabrous, black, "about 12 mm high" (MERRILL); seeds oblong-ovoid, pale, appressed pilose, about 6—7 mm long.

BORNEO, W. division, Kapoeas, Singtang, TEYSMANN 8298 (B); British North Borneo, without precise locality, CREAGH s.n. (K); Elphinstone Prov., Tawao, ELMER 20990, *type*, fruiting specimen, Oct. 1922—March 1923 (B, BD, K, P, S, U); Myburgh Prov., Sandakan, ELMER 20260, flowering specimen, Oct.-Dec. 1921 (B, BD, K, L, S, U); according to MERRILL scandent and forming tangled masses over thickets, especially along small streams. Moreover, MERRILL mentions the specimens Mrs. CLEMENS 11170, from Mount Kalawat, D. D. WOOD 769 and AGAMA 487, from the vicinity of Sandakan as to represent the same species. I am not sure that MERRILL's identification of the specimens WOOD 769 and AGAMA 487 is right. The specimens indeed resemble *M. borneensis*; the flowers are, however, too young for a sufficiently accurate examination.

Distribution: Borneo.

Remarks. The specimens TEYSMANN 8298 and CREAGH s.n. have smaller, 5—9 cm long, 3.5—7 cm broad, ovate leaves with an acuminate and not so distinctly cuspidate apex as is found in the specimens of ELMER.

16. Merremia pulchra VAN OOSTSTR., nov. spec. Fig. 3, a—c.

Frutex verisimiliter scandens, glaberrimus, ramis teretibus, griseobrunneis, sparse pallide lenticellatis, ad 3 mm diam., foliis petiolatis, petiolo supra longitudinaliter sulcato, 2—2.5 cm longo, ovatis, apice subabrupte acuminatis, acumine c. 1 cm longo, acuto, basi cordatis, 9—11 cm longis, 5.5—6.5 cm latis, nervo mediano nervis primariis utrinque 6—7 supra subimpressis, subtus prominentibus, nervis secundariis plusminusve parallelis, supra paullo prominulis, subtus planis, nervis tertiariis indistincte reticulatis; inflorescentiis axillaribus c. 20 cm longis, racemoso-ramosis, pedunculo nudo c. 6 cm longo, terete, ramis paucis tenuibus, inferioribus 7 cm, superioribus 5—2.5 cm longis, unifloris, pedicellis apicem versus angulatis et incrassatis, 1.5—2.5 cm longis; sepalis tenuiter coriaceis vel interioribus membranaceis, subaequilongis vel exterioribus paullo brevioribus, 25—28 mm longis, vel interioribus ad 30 mm longis, oblongis vel elliptico-oblongis, apice obtusis, minutissime mucronatis, corolla lutea, late infundibuliforme, c. 6 cm longa, glabra.

BORNEO, Sarawak, Muara Brunei bay, P. K. GNS (?) 14, April 1896 (S).

Distribution: Borneo.

Remarks. 1. "A fine yellow *Convolvulus*, very common in Borneo" (this remark on the label is presumably due to an interchange with the common *M. peltata*.

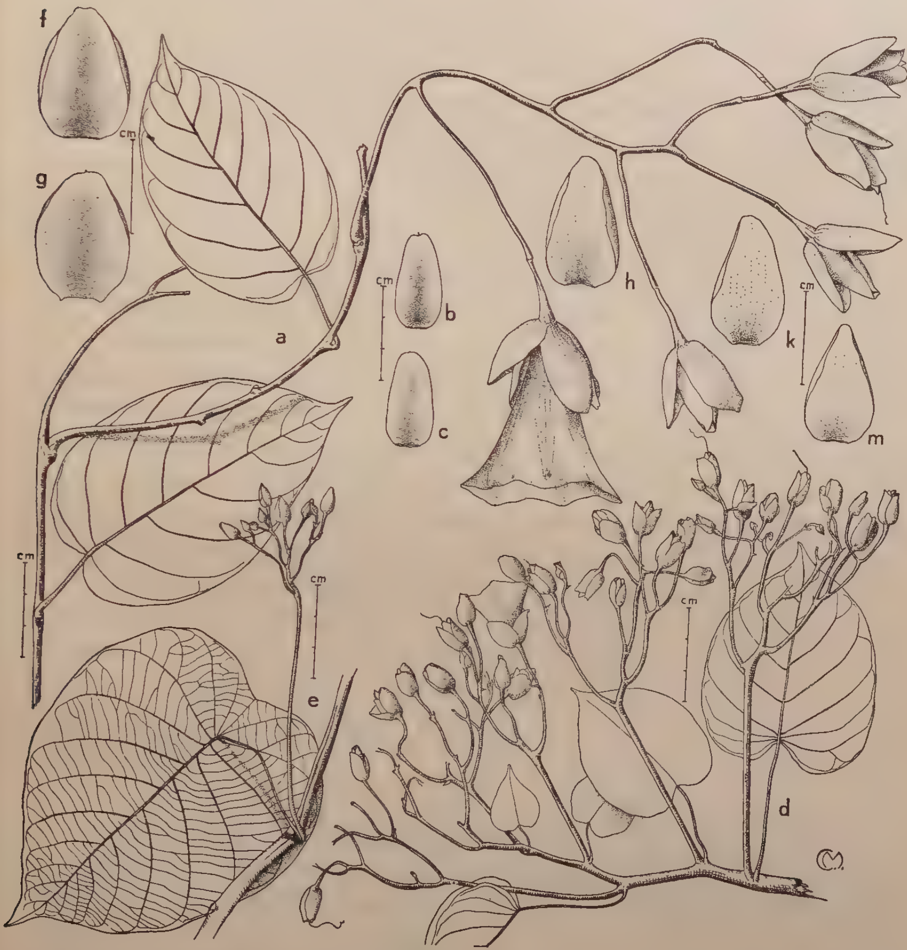

Fig. 3, a: *Merremia pulchra* VAN OOSTSTR., branch of the type (S); b—c: *id.*: two outer sepals; d—e: *M. Elmeri* MERRILL var. *glaberrima* VAN OOSTSTR., branches of the type (L); f—m: *id.*, sepals 1—5.

2. The type specimen possesses only one open flower, glued upon the sheet, of which I could not examine the interior parts. The species is, however, sufficiently characterized by the description given above.

17. Merremia crassinervia van Ooststr., nov. spec. Fig. 1, a.

Frutex scandens, glaberrimus, ramis teretibus, lenticellis pallidis verrucosis, cinereo-brunneis, ad 3.5(—4) mm crassis, solidis vel fistulosis; foliis ovatis (vel late ovatis) apicem versus attenuatis vel subacuminatis, apice obtuso vel subacuto, basi cordatis, margine integerrimis vel vix undulatis, 7—10(—13) cm longis, 3.5—5.5(—9) cm latis, petiolatis, petiolo 1.5—3.5(—5) cm longo, supra angustissime sulcato, nervo mediano supra impresso, subtus valde prominente, nervis primariis utrinque circ. 8, ascendentibus, curvatis, supra impressis, subtus valde prominentibus, nervis secundariis parallelis, supra impressis, subtus prominentibus, nervis tertiariis reticulatis supra subimpressis, subtus prominulis; inflorescentiis axillaribus, ad 20(—25) cm longis, laxe corymboso-ramosis, multifloris, ramis inferioribus in axillis foliorum minorum deciduorum, ramis superioribus in axillis bractearum minutarum, pedunculis a basi ad ramum inferiorem 7—10(—11) cm longis, teretibus, atrobrunneis; pedicellis 6—8 mm longis (in floribus juvenilibus) vel ad 15 mm longis (in floribus nonnullis expansis), subangulatis; alabastris conicis, acutis; sepalis subaequilongis, 11—12 mm longis; exterioribus 2 late ellipticis, valde concavis, apice rotundatis mucronulatis, subcoriaceis, interioribus 3 late ellipticis vel orbicularibus, apice rotundatis mucronulatis, margine scariosis; corolla infundibuliforme, glabra, limbo sublobato, circ. 2.5 cm longa; filamentis circ. 9 mm supra basin corollae insertis, circ. 8 mm longis, basi dilatata margine papillosa; disco cupulari; ovario conico, glabro, stylo glabro, stigmatibus globosis papillosis.

Borneo, Sarawak, Saribas, Paku, Haviland and Hose 3523E, Dec. 6, 1893 (L, *type*; K); the specimen in the Kew herbarium is numbered 3523K. A specimen collected in Borneo (precise locality unknown) by Beccari, n. 3594 (P), mentioned by Gagnepain [1]) under *Ipomoea Boisiana* is undoubtedly different from that species and most probably belongs here.

Distribution: Borneo.

Remarks. The Latin description has been made after the specimen in Leiden; the measures in parentheses have reference to the specimen in the Kew herbarium. The flowers of the type specimen are in a very young stage, only one open flower could be examined, in which, however, the anthers were destroyed. The greater part of the flowers of the specimen in Kew is very young too, some others have already lost their corolla.

18. Merremia Clemensiana van Ooststr., nov. spec. Fig. 1, d.

Frutex scandens, ramis teretibus, glabris vel apicem versus pubescentibus, leviter striatis, sub lente lenticellis pallidis minutissime verrucosis, ad 3.5(—5) mm diam.; foliis glabris ovatis (vel late ovatis) apicem versus gradatim attenuatis vel breviter acuminatis, apice obtusis mucronulatis, basi rotundatis, 5—9 cm longis, 3—5(—7) cm latis, petiolatis, petiolo 1—3 cm longo, glabro, supra anguste sulcato, nervo mediano supra impresso subtus prominente, nervis primariis utrinque 5—6, ascendentibus, curvatis, supra impressis, subtus prominentibus, nervis secundariis subparallelis supra prominulis vel indistinctis, subtus prominulis, nervis tertiariis reticulatis, supra prominulis, subtus planis, inflorescentiis axillaribus, plusminusve secundis, ad 12 cm longis, apice corymboso-ramosis, congeste plurifloris, pedunculis ad 8 cm longis, teretibus, glabris vel apicem versus pubescentibus, bracteis inferioribus foliaceis ad 3 cm longis, superioribus subulatis, minutis, 1.5 mm longis; ramis inflorescentiae brevibus pubescentibus; pedicellis 12—16 mm longis, glabris vel basi subpubescentibus, apice paullo incrassatis subangulatis; alabastris ovoideis, acutis vel obtusiusculis; sepalis glabris, 2 exterioribus subcoriaceis late oblongis, apice rotundatis, 7 mm longis, 3 interioribus late ellipticis vel orbicularibus, apice retusis, 8—9 mm longis, medio subcoriaceo, marginibus membranaceis; corolla lutea, campanulata vel late infundibuliforme, glabra, limbo vix lobato, crenulato (?), 1.5 cm longa; filamentis 2 mm supra basin corollae insertis, 7 mm longis, basi curvata, dilatata, margine basin papillosa, antheris 2.5—3 mm longis, glabris, rectis; disco brevi, obscure 5-lobato; ovario late conico, glabro, stylo glabro circiter 10 mm longo, stigmatibus globosis papillosis.

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[1]) Gagnepain in Notul. System. III (1914) p. 141, 142.

BORNEO, Sarawak, Kapit, Upper Rejang River, scandent in thickets and forests, J. and M. S. CLEMENS 21133, in the year 1929 (B, *type*; BD).

Distribution: Borneo.

Remarks. The data in parentheses in the Latin description have reference to the specimen in the Berlin herbarium.

19. Merremia Korthalsiana VAN OOSTSTR. in Kew Bull. (1938) p. 175.

A large woody twiner. Stems terete or obtusely angular, greyish brown when dry, substriate, glabrous or slightly pubescent in the younger parts; the young branches slender, 2—3 mm in diam., the adult ones thicker, to 7 mm in diam., fistulose. Leaves petiolate, petiole 2.5—6 cm long, black when dry, substriate and slightly sulcate above, the groove with some very short hairs or glabrous; the blade chartaceous or thin-coriaceous, broad-ovate or orbicular, abruptly acuminate or cuspidate at the apex, the acumen narrow, acute and 1—1.5 cm long; broadly cordate or truncate at the base, 6—15 cm long and 4—14 cm broad, blackish above in dry specimens and glabrous, opaque or more or less shining,

paler beneath and there pubescent on the nerves or glabrous; the primary nerves 7—8(—10) on each side of the midrib, arcuate, often subimpressed above, prominent beneath, the secondary nerves subparallel, prominulous above, prominent beneath, the tertiary nerves reticulate, prominulous above. Inflorescences axillary, long pedunculate, corymbosely ramified at the apex, to 20 cm long, secund or often forming a more or less umbellike panicle at the end of the branches, the peduncle to 12 cm long, pubescent or glabrous, longitudinally striate; primary branches many, in the axils of foliaceous bracts, pubescent, 1.5—4 cm long, cymose at the apex with several flowers; upper bracts small, linear-subulate, pubescent, 2.5—4 mm long; pedicels pubescent, 12—20 mm long; flower-buds ovoid, acutish; sepals black when dry, shining, broad-elliptic or orbicular, broadly rounded at the apex and whether or not minutely mucronate, glabrous outside, and with many minute resinous dots inside, equal in length or the outer ones slightly shorter, 9—10 mm long; corolla yellow, broadly funnel-shaped or campanulate, 20—24 mm long, obscurely lobed, glabrous outside, inside with some hairs below and between the bases of the filaments; filaments inserted about 5 mm above the base of the corolla, about 10 mm long, papillose at the margins of the slightly broadened base; anthers straight, glabrous, 3—4 mm long; disk low, slightly 5-lobed; ovary conical, glabrous; style glabrous, 11—12 mm long; stigma biglobular, papillose.

BORNEO, W. division, Liang gagang, HALLIER 3006, March 1894 (B, L); S. and E. division, Doesoen, KORTHALS 237 (L, *type*); Soengei Bloe-oe, JAHERI 376 (exp. NIEUWENHUIS) (B); id., JAHERI 1055 (exp. NIEUWENHUIS) (B, mixed with *M. peltata* (L.) MERRILL); id., JAHERI 1098 (exp. NIEUWENHUIS) (B); Darat Mahakam, AMDJAH 38 (exp. NIEUWENHUIS), Oct. 1898 (B); Sarawak, Mount Dulit, under 300 m, a frequent species, chiefly or entirely in secondary forest, RICHARDS 2219, Oct. 1932 (K); Upper Baram, Lio Matu, 500 ft, MOULTON, Singapore Field n. 6721, Oct. 1920 (B, S).

Distribution: Borneo.

20. Merremia peltata (L.) MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 441; id., Enum. Philipp. Fl. Pl. III (1923) p. 362; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1300 — *Convolvulus peltatus* L., Spec. Plant. (1753) p. 1194 — *Ipomoea nymphaefolia* BL., Bijdr. (1825) p. 719, non GRISEB.; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 107 — *I. peltata* (L.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 452; id. in DC., Prodr. IX (1845) p. 359; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 605; id., Suppl. (1860) p. 235; BENTH., Fl. Austr. IV (1869) p. 418; F.-VILL., Novis App. (1880) p. 140 (not seen); VIDAL, Sinopsis Atlas (1883) p. 34, t. 71, fig. C (not seen); VON MUELLER, Descr. Notes Pap. Pl. VII (1886) p. 30; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 412; Manson Bailey, Queensl. Fl. IV (1901) p. 1059; Merrill in Philipp. Bur. Forestr. Bull. I (1903) p. 50 (not seen); Manson Bailey, Compr. Cat. Queensl. Pl. (1909) p. 347; White in Contrib. Arn. Arbor. IV (1933) p. 93 — *Spiranthera peltata* (L.) Boj., Hort. Maurit. (1837) p. 226 (not seen) — *? Chironia capsularis* Blanco, Fl. Filip., ed. 1 (1837) p. 102 (doubtful); Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 63 — *? C. lanosanthera* Blanco, Fl. Filip., ed. 2 (1845) p. 71 (not seen); id., Fl. Filip., ed. 3 (1877) p. 132, Ic. II, t. 261, f. 1 (doubtful); Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 63 — *Operculina peltata* (L.) Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 549; id. in Engl., Bot. Jahrb. XVIII (1894) p. 119; id. in Meded. 's Lands Pl. t. XIX (1898) p. 545; Schum.-Lauterb., Fl. Deutsch. Schutzgeb. (1901) p. 517; Koord.-Schum., Syst. Verz. III (1914) p. 110 — *Merremia nymphaeifolia* (Bl.) Hall. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; id. in Bull. Herb. Boiss. V (1897) p. 381; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 510; Hall. f. in Bull. Herb. Boiss., sér. 2, I (1901) p. 675; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 305; Merrill in Philipp. Journ. Sc. III (1908) p. 430; Koorders, Exk. fl. Java III (1912) p. 113; Hall. f. in Engl., Bot. Jahrb. XLIX (1913) p. 379; Koord.-Schum., Syst. Verz. (1910—13) Conv. p. 5; Rendle in Journ. Linn. Soc. XLII (1914) p. 112; Boldingh, Zakfl. Java (1916) n. 832; Merrill, Spec. Blanc. in Philipp. Bur. of Sc. Publ. 12 (1918) p. 325; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 509; Ridley, Fl. Malay Penins. II (1923) p. 458; Rendle in Journ. Bot. LXIII, Suppl. (1925) p. 71; Heyne, Nutt. Pl. ed. 2 (1927) p. 1300.

A large climber, covering whole trees, occasionally procumbent; the stems from a large subterraneous tuber, terete, fistulose or pithy, with milky juice, glabrous or with some fulvous hairs at the base of the petioles, brownish or brownish-black when dry, the thickest parts striate. Leaves peltate, broad-ovate to orbicular or even broader than long, with a rounded or slightly retuse base (the leaves of the inflorescences sometimes cordate at the base and not or indistinctly peltate), the apex acuminate or abruptly cuspidate, the acumen acute and mucronulate; surfaces glabrous or the lower surface slightly hairy along the nerves; primary nerves 7—10 on each side of the midrib; secondary nerves many, distinctly parallel, finer nervation reticulate; length and width of the blade 7—30 cm; petiole shorter or longer than the blade, 3—20 cm long or more, glabrous. Inflorescences to 40 cm long, widely corymbose; the peduncles axillary, solitary or two in a leaf axil, stout, terete; flowers several to many; bracts deciduous; pedicels 18—25 mm long, thickened and angular above, clavate in fruiting stage and then to 50 mm long. Flower-buds narrow-ovoid, acute. Sepals large, 18—25 mm long, equal in length or the outer ones slightly shorter, the three outer ones broad-ovate, subcoriaceous, the two inner ones narrower, ovate-oblong, more membranous; minutely mucronulate at the obtuse apex. Corolla white or yellow, large, broadly funnel-shaped, 4.5—6 cm long, the limb slightly lobed. Filaments dilated and hairy below, the corolla inside above the place of insertion of the filaments with a semicircular thickening; anthers spirally twisted, hairy, disk 5-angular, 2 mm high. Ovary glabrous; style glabrous, not articulate at the base. Capsule opening by 4 valves, 4-celled, 4-seeded; valves splitting longitudinally into several laciniae. Seeds densely yellowish to dark-brown tomentose and long villose.

MALAY PENINSULA, Dindings, Pangkor, SCORTECHINI 1074, July 1884 (K); id., RIDLEY 7158, March 1896, y[1]) (K, S); Pahang, RIDLEY 141, May 1890 (S); Pulau Tiuman, BURKILL s.n., June 1915 (S); Pekan, RIDLEY s.n., Aug. 1889 (S); Kuala Lipis, BURKILL and HANIFF 15701, Nov. 1924, y (K, S); Negri Sembilan, Bukit Danan, ALVINS 284 (594), Jan. 1885 (S); Malacca, Selandor, DERRY 377, Nov. 1889 (S); id., ALVINS s.n., March 1886 (S); Chabau, ALVINS 2217, Sept. 1885 (S); Singapore, Botanic Gardens, SAPPAN s.n., March 1932, y (B, S).

SUMATRA, Mt. Tengamoes, 1500 ft, FORBES 1837 (BD, L); Atjeh and Dependencies, Simaloer, ACHMAD 321, March 1918, w[1]) (B, L); East Coast, YATES 1012 (B); Senembah, S.E. of Medan, grassfield, 30—50 m, LÖRZING 3598, March 1915, y (B, L); Haboko Estate, edge of virgin forest, c. 150 m, DOCTERS VAN LEEUWEN 3187, Febr. 1919, y (B); Badjalinggi, S. of Tebingtinggi, c. 100 m, LÖRZING and JOCHEMS 7532, Oct. 1920 (B); Asahan, Hoeta Padang, near the Continental Plantation Company concession, in forests on "red" soil, along river, KRUKOFF 4434, Nov.-Dec. 1932 (L, S); Tapanoeli, Nias, VON RÖMER XVII, y (B, mixed with *Merremia umbellata* (L.) HALL.f.); Batoe island, RAAP 201, Sept. 1894 (B); West Coast, Pariaman, DIEPENHORST 2910 HB (B, L, U); Doekoe, KORTHALS s.n. (L); Soeka Menanti, Ophir district, thickets, frequent, 120 m, BÜNNEMEYER 194, Apr. 1917, y (B); Talakmau, W.-slope, common, c. 400 m, BÜNNEMEYER 345, Apr. 1917, y (B); Moeara Laboeh, c. 700 m, ULTÉE 122 (B); Mentawai-islands, Sipora, near Sioban, IBOET 364, Oct. 1924, y (B, L); Benkoelen, Enggano, virgin forest behind Meok, LÜTJEHARMS 3602, May 1936 (B, L); id., near Boea boea, c. 100 m, LÜTJEHARMS 4419, June 1936 (B, L); Lampoengs, G. Raté Telanggaran, slope, c. 400 m, IBOET 81, Nov. 1921, y (B); Kotaboemi estate, c. 50 m, administrator of Kotaboemi estate 9, March 1924, y (B); Sebesi-island, frequent, edge of virgin forest, c. 100 m, DOCTERS VAN LEEUWEN 5364, Apr. 1921, y (B); Riouw and Dependencies, Anambas islands, Siantan, Terempa, HENDERSON, Singapore Field n. 20156, March 1928 (S); id., near the coast in secondary forest, rather frequent, 75 m, VAN STEENIS 781, March 1928, y (B, L, S); id., Temaja, padang near Letong, on rocks, c. 200 ft, HENDERSON, Singapore Field n. 20487, Apr. 1928 (B, K, S); Bangka, KOBUS s.n. (B); Batoe roesa, TEYSMANN s.n. (B, L).

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[1]) y: flowers yellow, w: flowers white.

Java, without precise locality, Blume s.n. (B, U); Horsfield Conv. 15 and 15 bis (K); Kuhl and van Hasselt s.n. (L); Ploem s.n. (B); Bantam, Pasaoeran, sec. forest, 25 m, Backer 7275, March 1913 (B); between G. Kendeng and Malingping, 100—300 m, Backer 1334, June 1911, y (B); G. Kantjana, very frequent, Koorders 41118 β, June 1912, y (B); Batavia, Tjikoja, Zollinger 503, Aug., y (BD, K, L); Buitenzorg, Depok, 93 m, Koorders 31155 β, Aug. 1898 (B); id., Koorders 42555 β, Febr. 1914 (B); id., Koorders 44068 β, July 1918, y (B); id., Koorders 44151 β, July 1917, y (B); id., Soegandiredja 329, June 1900 (B, L); Buitenzorg, Boerlage s.n., Febr. 1889 (K, L); id., Hallier s.n., Febr. 1896 (B); id., cultivated in the Botanic Garden XV, H. 21; XV. H. 21a; XV. G. 74; XV. G. 74a (B); G. Wangoen, between Tjidjeroek and Paboearan, S. of Batatoelis, rare, Hallier s.n., Aug. 1896 (B); Moeara Tjiomas, Boerlage s.n., Sept. 1888 (L); G. Tjipoeti, near Tjampea, edge of forest, bank of Tjiteureup, 500 m, Bakhuizen van den Brink 4195, Sept. 1920, y (B, L); Pasir Angsana, Tjibata, S.W. of Leuwiliang, Bakhuizen van den Brink 7815, Aug. 1931, y (B, K, L, P); S. of Leuwiliang, thickets, 500 m, Backer 25967, Sept. 1918 (B); Palaboehanratoe, young forest, Koorders 34661 β (B); id., Koorders 34662 β, y (B); Tjikante near Tjiloa, Zandbaai, thickets, 50 m, Backer 25638, Aug. 1918 (B, L); G. Kate near Soekaboemi, sec. forest, 400 m, Backer 15065, July 1914 (B); Bodjonglopang, thickets, frequent, 500—600 m, Backer 16960, Nov. 1914 (B); between Lengkong and Tjitjoeroeg, edges of sec. forests and thickets, 500—600 m, Backer 17142, Nov. 1914 (B); Tjikembar, thickets, 300 m, Backer 16890, Nov. 1914 (B); Tendjo, thickets, rather frequent, 80 m, Backer 24050, Apr. 1918 (B); Salak, Blume s.n. and 1505 (L, *type of Ipomoea nymphaefolia* Bl.); Salak, near Bobodjong, 700 m, Koorders 24178 β, Sept. 1896, y (B, L); Priangan, Kalipoetjang, Scheffer s.n. (B); Banjoemas, Noesa Kambangan, near Karang-tengah, c. 50 m, van Straelen 26, Apr. 1918 (B); Kediri, Prigi, plain behind beach, frequent, 5 m, Backer 12008, Febr. 1914 (B); Malang, Tangkil, virgin forest Sempol, 200—300 m, Koorders 23380 β, June 1896, y (B); id., 400—500 m, Koorders 23694 β, June 1896 (B); Tengger, 400 m, Buysman 206, Aug. 1907 (U); Besoeki, Blambangan, Horsfield (according to Miquel).

Borneo, without precise locality, Korthals s.n. (L); W. division, Kapoeas, Teysmann 8295 (B); S. and E. division, Bandjermasin, Korthals s.n. (L); Martapoera, Korthals s.n. (L); Soengei Bloe-oe, Jaheri 1055, exped. Nieuwenhuis (B, mixed with *Merremia Korthalsiana* van Ooststr.; L); P. Laoet, N.E. of Stagen, 75 m, van Slooten 2300, Nov. 1928, y (B, L, U); Hayoep, Winkler 3383, Sept. 1908, y (BD); Sarawak, Beccari 665 (BD, K); Baram district, Baram, Hose 221, Nov. 1894 (K); British North Borneo, Creagh s.n. (K); Banggi, Fraser 213, March 1885 (K); Tenom, everywhere over bamboos and trees, 700 ft, Gibbs 2908, Jan. 1910, w (K); Lahut Dalu, Creagh s.n., Apr. 1895, y (K).

Celebes, without precise locality, "common in the lower parts", Sarasin 1103, May 1895, y (BD); de Vriese 215, y (L); G. Padang Kadjang, Rachmat 829, exped. van Vuuren, Nov. 1913 (B); Beroe-beroe, Rachmat 331, exped. van Vuuren, July 1913 (B); Celebes and Dependencies, Balotji Sehroh, Teysmann 12598 (B); Kendari, forest, 100 m, Kjellberg 700, March 1929 (B); Emekang, forest on bank, Kjellberg 1372, May 1929, y (B); Manado, Minahassa, Hose 795 (K); Amoerang, Koorders 16565 β, March 1895 (B, L); id., Koorders 16566 β, Apr. 1895 (B, BD, L); id., Koorders 16567 β (B, L); between Rano ketang and

Amoerang, Koorders 16568β, March 1895 (B, K); between Manado and Tomohon, very frequent, especially between 200—400 m, Koorders 16569β, Jan. 1895, y (B, L); near Ajermedidi, in young thickets, very frequent near bridge of Tondano river, on volcanic sand, 150 m, Koorders 16570β, Dec. 1894, y (B, L).

Moluccas, Halmaheira, Tobelo, administrator of Tobelo, May 1919 (B); Ternate, Lagoena, thickets, c. 300 m, Beguin 627, May 1920, w (B, L); Ceram, between Kabailoe and Manco, virgin forest, 200—400 m, Rutten 241, Oct. 1917, w (B); Wai Moessi, virgin forest, 0—100 m, Rutten 408, Nov. 1917, w (B); W. Ceram, E. of Laioewin, virgin forest, c. 100—200 m, Rutten 1696, Sept. 1918, w (B, L, U); S.E. Ceram, Kotta, 100—200 m, Kornassi 1016, Febr. 1918, w (B, L); Amboina, Robinson, Pl. Rumph. Amb. 401, July—Nov. 1913, w (B, K, L, P); G. Haroemesen, 0—100 m, Kornassi 1183, Apr. 1918, w (B, L, U).

New Guinea, Mamberamo, Taua, bank of river, Moszkowski 233, July 1910, w (BD); Sabang-camp, virgin forest, Versteeg 1741, Sept. 1907, w (B); Hollandia, c. 10 m, Gjellerup 178, July 1910, w (B); Rouffaer river, frequent, 175 m, Docters van Leeuwen 10179, Aug. 1926, w (B); Nassau Mountains, Explorateurs bivak, edge of ladang, c. 700 m, Docters van Leeuwen 10513, Oct. 1926, w (B); Kloofbivak, on sandy soil, Pulle 225, Oct. 1912, w (B); near Gelieb, Branderhorst 158, Oct. 1907 (B); Territory of New Guinea, Matatakum, Weinland 285, June 1890 (B, BD, S); Nuru River, 160 m, Lauterbach 2246, June 1896, w (BD); Sepik River, Malu, riverbanks, 20—40 m, Ledermann 6853, March 1912, w (BD); Alexishafen, Wiesenthal 30, Nov. 1912, w (BD); Papua, Strickland River, Baeuerlen (according to von Mueller, 1886); Koitaki, forest, c. 1500 ft, Carr 12632, June 1935, w (L); Lower Fly River, east bank, opp. Sturt Island, common on river bank, Brass 8191, Oct. 1936, w (L).

Bismarck Archipelago, according to Warburg and to Schumann and Lauterbach.

Philippine Islands; according to Merrill often common in secondary forests, at low and medium altitudes. Luzon, Ahern 297 (B); Ahern 226 (B); prov. Laguna, Los Baños, Curran 13241, March 1912 (K); id., Merrill, Spec. Blanc. 952, Nov. 1915 (B, BD, K, L); Mt. Maquiling, Robinson and Foxworthy, Bur. of Sc. 17273, Febr. 1913 (L); prov. Tayabas, Kabibihan, Ramos, Bur. of Sc. 13307, Febr.-March 1911 (BD, K, L); prov. Sorsogon, Irosin, Mt. Bulusan, Elmer 15605, Dec. 1915 (B, K, L, U); Mindoro, Baco, Merrill 1665, March 1903 (BD); Mindanao, distr. Davao, Todaya, Mt. Apo, Elmer 10836, June 1909 (B, L); Camaguin de Mindanao, Ramos, Bur. of Sc. 14665, March-Apr. 1912 (B, L); Palawan, Bermejos, Bur. of Sc. 265, Dec. 1905 (BD); Paragua, E-wi-ig River, Merrill 698, Febr. 1903, y (BD); according to Merrill the species has been collected also in Balabac, Samar, Leyte and Panay.

Christmas Island, Murray hill track, Ridley 90, Oct. 1904, y (K).

Distribution: Madagascar, Mascarenes, Seychelles, Malay Peninsula, Malay Archipelago, Philippines, New Guinea, N. and E. Australia, Polynesia.

Vernacular names: akar ulan, akar ulan gajah (Malay Peninsula, Alvins); akar sambang, akar sambong, akar sambon (Mal., W. Sumatra, Bünnemeyer, Diepenhorst, Miquel); rabana oeding (Simaloer, Achmad); akar lonkemboeng (Mal., Palembang, according to Lütje-

HARMS); ritang (Bangka, KOBUS); melading (Mal., Bangka, HEYNE); areuj tjarajoen, tjarajeun (Sund., Java, BLUME, HEYNE, KOORDERS, SCHEFFER); areuj kipalompong, areuj kipaloempoeng (Sund., Buitenzorg, Bantam, KOORDERS, BAKHUIZEN VAN DEN BRINK); akar belaran (Noesa Kambangan, VAN STRAELEN); kloerak, kangkoeng tirto (Jav., Malang, KOORDERS); tappagadja (Mal., MIQUEL); boekaloeng (Bali, MIQUEL); blaran (S.E. Borneo, P. Laoet, VAN SLOOTEN); balanteteh, talabo (Celebes, RACHMAT); wanaring, manaring (Minahassa, Tontemboan and Tonsea language, HALLIER, HEYNE, KOORDERS); tichinian (Minahassa, Tonsawang language, HALLIER, HEYNE, KOORDERS); daoen ramboet, obat ramboet (Mal., Ambon, HEYNE); halen, hailale (Alf., Amboina, RUMPHIUS, MIQUEL, HEYNE, KORNASSI); long (S. Halmaheira, Weda, HEYNE); koegè, koegètè (N. Halmaheira, HEYNE); koegè (Ternate, BEGUIN, HEYNE); budakín (Philipp.: Bagóbo language); bulakán (Philipp.: Tagálog and Bisáya language); bulak-bulakán (Philipp.: Bíkol language); burákan (Philipp.: Samar-Leyte Bisáya, Bíkol and Súlu language); tampinita (Philipp.: Subánun language) (the Philippine names all after MERRILL).

Use: The tubers are edible. For medicinal use see HEYNE l.c.

Remarks. *M. peltata* has been based by MERRILL on LINNAEUS's *Convolvulus peltatus* (1753), a white-flowered species from Ambon, described by RUMPHIUS in his Herbarium Amboinense (V, 1747, p. 428, t. 157, fig. 1, 2) under the name of Convolvulus laevis indicus major (alba). *Ipomoea nymphaefolia* has been described by BLUME in 1825 on yellow-flowered specimens from Java, and later on placed in the genus *Merremia* by HALLIER under the name of *M. nymphaeifolia*.

MERRILL, discussing the identity of the plant of RUMPHIUS, points out that he cannot detect a single character by which the species *M. peltata* and *M. nymphaeifolia* can be distinguished except the colour of the flowers. With this finding I fully agree. The yellow-flowered form appears to be constricted, with a few exceptions, to the western part of the area of the species, whereas the form with white flowers occurs in the eastern part. As the collector's labels are unfortunately often very incomplete as to the colour of the flowers, it is in many cases impossible to decide, to which form a specimen belongs. As far as possible the specimens with white and with yellow flowers are indicated above respectively with w and y.

PRAIN, 1894, describes the colour of the corolla as yellowish-white with red spots in the Mascarene Islands, yellow or white or purplish in Malaya, white in N. Australia and Polynesia. (See remarks under *M. umbellata* (L.) HALL. f.).

21. **Merremia Elmeri** MERRILL in Univ. Calif. Publ. Bot. XV (1929) p. 261.

A large woody twiner, the stems, the inflorescences and the lower surface of the leaves, especially the nerves greyish pubescent to villose. Stems stout, terete or slightly applanate, to 5—7 mm in diam., black or brownish black when dry, greyish pubescent, glabrescent. Leaves peltate, broad-ovate to orbicular, rounded to slightly retuse at the base, more or less abruptly acuminate to cuspidate at the apex, with a narrow and acute acumen; glabrous above, pubescent beneath, especially on the nerves; blade 6—20(—25) cm long and 5—17(—21) cm broad; the petiole shorter or longer than the blade, 3—14(—23) cm, glabrous or slightly pubescent; primary nerves 8—10 on each side of the midrib, curved at the margin; secondary nerves many, parallel; tertiary nerves reticulate. Inflorescences solitary or in pairs in the leaf-axils, 7 to 25 cm long, more or less secund; peduncles terete or applanate at the top, pubescent and glabrescent like the stems, patent, corymbosely branched at the ends, from about 5—15 cm above the base, several-flowered; bracts deciduous, the lower ones sometimes foliaceous, not peltate, pedicels angular, striate, sparsely hairy or glabrous, 7—15 mm long; flower-buds ovoid, acute or obtusish. Sepals smaller than in *M. peltata*, broad-elliptic to elliptic-oblong, 9—13 mm long, the outer ones concave, obtuse, glabrous, subcoriaceous, longitudinally striate outside, the inner ones thinner, obtuse or slightly emarginate, glabrous, all persistent and somewhat enlarged in fruit. Corolla white, except the blackish grey basal outer parts (MERRILL), funnel-shaped to campanulate, smaller than in *M. peltata*, 3—3.5 cm long, outside minutely granulose-glandular; the limb indistinctly lobed, with ciliate margin. Filaments inserted 5—7 mm above the corolla base, 5—6 (9, MERRILL) mm long, broadened at the base and there sparsely papillose at the margins; corolla base with a semicircular thickening above the place of insertion of each filament; anthers 5—6 mm long, twisted, villose. Ovary ovoid, glabrous, style filiform, c. 12—15 mm long; disk 1.5 mm high. Capsule subglobose to broad-conical, 2-celled, 4-seeded, the wall splitting into several valves, the valves striate outside; diameter of capsule 13—14 mm; seeds short-pubescent, brownish-black, the margins bearded with long brown hairs; length of seeds to 6.5 mm.

BORNEO, W. division, Goenoeng Kenepai, HALLIER 1844, Jan. 1894 (B); S. and E. division, Boeloengan, Tikoeng, AMDJAH 918, Nov. 1912, a fruiting specimen (B, K, L); British North Borneo, Elphinstone Prov., Tawao, sprawling over open thickets in recently cleared land in rather wet places, ELMER 20396, *type*, Oct. 1922—March 1923, a flowering specimen (B, BD, K, L, P, S, U).

Distribution: Borneo.

var. **glaberrima** van Ooststr., nov. var. Fig. 3, d—m.

Planta glaberrima, habitu speciei.

Borneo, W. division, Soengai Saniai, Hallier 3370, April 1894 (B, BD, K; L, *type*); Sarawak, Beccari 3955 (K).

Distribution: Borneo.

Section 5. **Wavula** van Ooststr.

Van Ooststr. in Blumea III (1939) p. 266.

Closely related to section *Xanthips*. Flower-buds ovoid to narrow-ovoid or oblong, subacute; the midpetaline bands of the corolla not with distinct dark lines; inflorescences subumbelliform; flowers moderate to large; top of the pedicels immediately below the calyx with a ring of small thick lobes.

22. Merremia similis Elmer in Leafl. Philipp. Bot. I (1908) p. 335 — *? Convolvulus distillatorius* Blanco, Fl. Filip., ed. 1 (1837) p. 95; id., ed. 2 (1845) p. 70 (not seen); id., ed. 3, I (1877) p. 130 — *Merremia distillatoria* (Blanco) Merrill, Spec. Blanc. in Philipp. Bur. of Sc. Publ. 12 (1918) p. 325; id., Enum. Philipp. Fl. Pl. III (1923) p. 360 as to the specimens only.

"Subscandent and sprawling" (Elmer). Stems terete, smooth or finely striate, fistulose, 2.5—4.5 mm in diam., the young parts densely grey or rusty pubescent or farinose to short-tomentose, glabrescent; the glabrous parts dark brown in dried specimens. Leaves petiolate, the petiole short-tomentose like the stems, glabrescent, 3—17 cm long, the blade herbaceous to chartaceous, broad-ovate to orbicular, abruptly acuminate with narrow acumen, the base broadly cordate; densely short-tomentose with short curled hairs on both sides in youth, later the upper surface glabrescent, at last with some scattered white hairs, especially along the nerves, the lower surface with a dense short tomentum of rusty brown or greyish brown colour. Length of the blade 8.5—18(—20, Elmer) cm, width 8—16(—20, Elmer) cm. Primary nerves 7—10 pairs, curved at the margin, secondary nerves many, parallel, all distinctly prominent beneath, the tertiary nervation reticulate. Inflorescences axillary with a long peduncle, which is branched close to the top, the peduncle terete, tomentose to farinose like the stems, glabrescent, to 30 (according to Elmer to 60) cm long and 2—4 mm thick; the branches about 1 cm long or slightly longer. Pedicels gradually thickened to the top, with a thick lobed ring immediately below the place of insertion of the sepals, farinose, glabrescent towards the top, 2—3 cm long, in fruit erect, 4—4.5 cm long. Bracts elliptic, 2—2.5 mm long, glabrous inside, densely short-tomentose outside, deciduous. Flower-buds narrow-ovoid to oblong, acute. Sepals concave, thin-coriaceous with membranous margin and with glandular dots, obovate to broad-elliptic or orbicular, obtuse, or the outer ones slightly retuse, minutely mucronate, to 15—18 mm long, the innermost one a little shorter, the calyx enclosing the fruit as a cup, the sepals then to 20 mm long. Corolla "white with a tinge of red" (ELMER), broadly funnel-shaped, slightly 5-lobed, 4 cm long, nearly glabrous, only with some hairs at the top of the mid-petaline bands. Filaments inserted about 12 mm above the corolla base, 16—18 mm long, glabrous except the somewhat dilated, pilose base; the corolla tube inside with two hair lines below the place of insertion of each filament. Anthers twisted, glabrous. Disk ring-shaped, high. Ovary conical, glabrous. Style glabrous, ± 28 mm long. Stigma biglobular, papillose. Capsule ovoid, 4-valved, about 15—18 mm long, the soon loosing thin outer layer of the valves brownish-black, later the valves are straw coloured outside, white inside. Seeds 6 mm long, black, sparsely tomentose and densely long villose.

PHILIPPINE ISLANDS, "in thickets and secondary forests at low and medium altitudes" (MERRILL). Luzon, Laguna (MERRILL); prov. Tayabas, without precise locality, TOPPING, Bur. of Sc. 1971, Dec. 1914 (B, BD, L, S); near Malicboi, TOPPING: MERRILL Spec. Blanc. 738, Dec. 1914 (B, BD, K, L); Kabibihan, RAMOS, Bur. of Sc. 13292, Febr.-March 1911 (K, L); Albay, Bataan island, MERRILL 11611, Sept. 1922 (BD, K); prov. Sorsogon, Irosin, Mt. Bulusan, ELMER 15602, Dec. 1915 (B, BD, K, L, P, U); Leyte, Palo, ELMER 7341, Jan. 1906, *type of M. similis* (B, K); Panay (MERRILL); Sibuyan, Magallanes, Mt. Giting-giting, ELMER 12061, March 1910 (B, K, L); Negros, Cadiz, CELESTINO, Bur. of Sc. 7342, Febr.-March 1909 (BD); Mindanao, prov. Surigao, RAMOS and PASGASIO, Bur. of Sc. 34758, June 1919 (L, S); prov. Misamis (MERRILL).

Distribution: Philippine Islands.

Vernacular names: bulakán (Philipp.: Panay Bisáya language, MERRILL); burakan (Philipp., MERRILL).

Remarks. MERRILL supposes that *Merremia similis* ELMER is identic with *Convolvulus distillatorius* BLANCO, for which MERRILL made the new combination *Merremia distillatoria* (BLANCO) MERRILL. If MERRILL is right, the latter name has priority. In my opinion it is not quite certain that the plant described by BLANCO is the same as ELMER's plant. It must be stated that there are some points of resemblance. BLANCO describes, however, the leaves as being about 5-nerved and having a toothed, though obscurely toothed margin, both characteristics not corresponding with those found in the specimens for which MERRILL used the name *M. distillatoria.* I therefore propose to reject MERRILL's combination as being based on a dubious species and to use ELMER's name *M. similis.*

XIV. OPERCULINA S. MANSO

S. MANSO, Enum. Subst. Bras. (1836) p. 16 (not seen); PETER in ENGL.-PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 32; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 582; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 502, 510; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 307; KOORDERS, Exk. fl. Java III (1912) p. 114; RIDLEY, Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 363; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 519 — *Spiranthera* BOJ., Hort. Maurit. (1837) p. 226 ex p. (not seen) — *Piptostegia* REICHB., Nom. (1841) p. 113 (not seen).

Large, herbaceous twiners; stems, peduncles and petioles often winged. Leaves entire, angular or digitate, often cordate at the base. Flowers large, axillary, solitary or in few-flowered cymes. Sepals large, mostly glabrous, pergameneous to coriaceous, brown, often ventricose, often much enlarged in fruit and becoming more or less coriaceous and then often with irregularly lacerate margin. Corolla large, broadly funnel-shaped or campanulate, white or yellow, glabrous or with hairy midpetaline bands. Stamens and style included. Stamens 5; filaments filiform, anthers large, often spirally twisted afterwards; pollen smooth, ellipsoid. Disk annular. Ovary glabrous, 2-celled, each cell with 2 ovules; style 1, filiform; stigma biglobular. Fruit a large, dry capsule, epicarp circumscissile, the upper part of it (operculum, lid) more or less fleshy, endocarp scarious, at first entire, at length irregularly splitting. Seeds 1 or more, large, trigonous or globular, glabrous, black.

Distribution: Tropics generally.

Remarks. PETER, l.c., divided the genus into 3 sections:

1. *Pteropodae* PETER, l.c. p. 32, leaves entire, peduncles winged.
2. *Apterae* PETER, l.c., leaves entire, peduncles not winged.
3. *Digitatae* PETER, l.c., leaves digitate, peduncles winged or not.

Key to the species.

1a. Stems terete. Sepals orbicular, broadly rounded to slightly emarginate at the apex. Midpetaline bands of corolla pilose . . . . **3. O. Riedeliana**
b. Stems alate or angular. Corolla glabrous 2
2a. Outer sepals pubescent, ovate to broad-ovate, acute to short acuminate . . . . **1. O. Turpethum**
b. Sepals glabrous, broad-elliptic to orbicular, broadly rounded at the apex . . . . **2. O. Brownii**

1. **Operculina Turpethum** (L.) S. MANSO, Enum. Subst. Bras. (1836) p. 16 (not seen); HALL. f. in ENGL., Bot. Jahrb. XVIII (1894) p. 120; id. in Versl. 's Lands Plantent. 1895 (1896) p. 127; id. in Bull. Herb. Boiss. V (1897) p. 380; id. in Meded. 's Lands Plantent. XIX (1898) p. 545; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 510; COOKE, Fl. Bombay II (1905) p. 240; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 308; HALL. f. in VALETON, Pl. Pap. in Bull. Dép. Agric. Ind. Néerl. X (1907) p. 51; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 110; KOORDERS, Exk. fl. Java III (1912) p. 114; KOORDERS-SCHUM., Syst. Verz. (1910—13) Conv. p. 3; id., l.c. (1914) p. 110; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 442; id., Spec. Blanc. in Bur. of Sc. Public. 12 (1918) p. 325; GAMBLE, Fl. Pres. Madras V (1923) p. 929; RIDLEY, Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 363; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 520 — *Convolvulus Turpethum* L., Spec. Plant. (1753) p. 155; Bot. Mag. (1819) t. 2093; ROXB., Fl. Ind. ed. CAREY and WALL. II (1824) p. 57; WALL., Cat. (1828) n. 1371; ROXB., Fl. Ind. I (1832) p. 476 (*C. Turpethum* WILLD.); HASSK., Pl. Jav. Rar. (1848) p. 518 — *Convolvulus anceps* L., Mant. I (1767) p. 43; VAHL, Symb. III (1794) p. 31 — *C. triqueter* VAHL, l.c. p. 30, the type of VAHL is unknown to me — *Ipomoea Turpethum* (L.) R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 485; Bot. Reg. IV (1818) t. 279; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 450; id. in DC., Prodr. IX (1845) p. 360; MIQ., Fl. Ned. Ind. II (1857) p. 606; id., Suppl. (1860) p. 235; BENTH., Fl. Austr. IV (1869) p. 418; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 212; HEMSL., Rep. Chall., Bot. I, 3 (1884) p. 169; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; v. MUELLER, Descr. Notes Pap. Pl. VIII (1886) p. 49; WATT, Dict. Econ. Prod. Ind. IV (1890) p. 493; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 413; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 222; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1060; id., Compr. Cat. Queensl. Pl. (1909) p. 349; GAGNEP. et COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 263; BOLD., Zakfl. Java (1916) n. 827 — *I. anceps* (L.) R. et S., Syst. IV (1819) p. 231; BLUME, Bijdr. (1825) p. 714 (*I. anceps* VAHL); CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 450; id. in DC., Prodr. IX (1845) p. 360; ZOLL., Syst. Verz. 2. Heft (1854) p. 129 — *I. triquetra* (VAHL) R. et S., Syst. IV (1819) p. 231; CHOISY in DC., Prodr. IX (1845) p. 360, see above under *Convolvulus triqueter* VAHL — *Spiranthera Turpethum* (L.) BOJ., Hort. Maurit. (1837) p. 226 (not seen) — *Convolvulus maximus* BLANCO, Fl. Filip. ed. 1 (1837) p. 91; ed. 2 (1845) p. 67 (not seen); ed. 3, I (1877)

p. 127, non L., nec Buch. Ham. (according to Merrill) — *I. reptans* Llanos, Fragm. Pl. Filip. (1851) p. 55; F.-Vill. and Naves in Blanco, Fl. Filip., ed. 3, IV 1 (1880) p. 39, non Poir. (according to Merrill) — *I. ventricosa* Llanos, l.c. p. 56; F.-Vill. and Naves, l.c. p. 40, non G. Don (according to Merrill) — *Argyreia alulata* Miq., Fl. Ned. Ind. II (1857) p. 587 — *Ipomoea Turpethum* (L.) R. Br. var. *anceps* Miq., Fl. Ned. Ind. II (1857) p. 607 — *Argyreia alata* Montr. in Mém. Acad. Lyon X (1860) p. 236 — *Operculina Turpethum* (L.) Peter in Engl.-Prantl, Nat. Pfl. fam. IV, 3a (1891) p. 32; Schum.-Lauterb., Fl. Deutsch. Schutzgeb. (1901) p. 518 — *Ipomoea diplocalyx* Baker in Kew Bull. (1894) p. 71 — *Operculina Turpethum* (L.) S. Manso var. *heterophylla* Hall. f. in Versl. 's Lands Plantent. 1895 (1896) p. 127; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 510 — *Merremia Turpethum* (L.) Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 102.

Perennial herb. Roots long, slender, fleshy, much branched. Stems robust, twining, narrowly 3—5-alate (wings green or more or less purplish, Backer), sulcate or angular, often strongly contorted, 2—4 m high (Backer), up to 4, sometimes to 6 mm in diam., glabrous or sparsely short-pilose, especially at the nodes, the young parts sometimes more or less tomentose. Leaves petiolate, petiole much shorter than the blade, short-pilose, slender, terete or occasionally alate, 2.5—7.5 cm long; blade very variable in form, orbicular, broad-ovate to ovate-lanceolate or lanceolate, entire or sometimes coarsely dentate or slightly lobed, apex acuminate, acute or obtuse, mucronulate, base cordate, sometimes hastate; glabrous or appressed pilose above, pubescent beneath. Midrib and primary nerves prominent beneath, primary nerves 8—11, secondary nervation parallel. Broad leaves: 5.5—15 cm long and 4—14 cm broad, narrow leaves 5.5—7.5 cm long, 1—2.5 cm broad. Inflorescences 1-flowered or cymosely branched, few-flowered; peduncles axillary, mostly terete and glabrous or pubescent at the base, upwards applanate and pubescent, 2—18 cm long, occasionally the peduncles are alate like the stems; pedicels angular, pubescent, 12—15 mm or those of the middle flower to 35 mm long, clavate and elongated in fruit, to 40 mm long; bracts large, concave, oblong or elliptic-oblong, mucronulate, scarious, pubescent, short-ciliate at the margin, 1.5—2 cm long, deciduous. Sepals ovate or broad-ovate, acute or short-acuminate, mucronulate, the outer ones pubescent outside, the inner ones completely or partly glabrous, outer 1.5—2.5 cm long, inner about 2 cm long; in fruit the sepals are 3—3.5 cm long and the calyx is very broadly cup-shaped and to 6 cm in diameter. Corolla broadly funnel-shaped, 3—4.5 cm long, glabrous, white or white with yellowish base (Backer). Stamens inserted about 7 mm above the corolla base, dilated and sparsely pubescent below, with a tooth above the place of insertion. Ovary globular, glabrous. Style filiform, 15—17 mm long, stigmas globose, papillose. Capsule depressed-globose, 1.5 cm in diam., the epicarp circumscissile, the upper part (lid) fleshy; the endocarp scarious, irregularly dehiscent. Seeds 4 or less, smooth, black, opaque, 6 mm in diameter.

Malay Peninsula, Malacca, Griffith s.n. (according to Prain, 1906; according to Ridley, 1923, "Griffith's plant in Herb. Kew was collected in Mergui, and no one else has found it in the Peninsula").

Sumatra, without precise locality, Korthals s.n. (L); Lampoengs, Sebesi island, in mixed forest, frequent, Docters van Leeuwen 5170, Apr. 1921 (B); Krakatau, S.E. side, c. 200 m, forest in ravine, Docters van Leeuwen 6018, Jan. 1922 (herb. D. v. L.); id., c. 100 m, wall of ravine, Docters van Leeuwen 6020, Jan. 1922 (herb. D. v. L.); id., ravines far behind the beach, Boedijn 2509 A, Apr. 1933 (B); see remarks.

Java, according to Backer from West to East Java, in the parts with a rather to very strong east monsoon, in thickets and hedges, occasionally in sugar plantations as a weed; Bantam, Oedjong Koelon, Amdjar 41, Oct. 1913 (B); Batavia, Batavia, in thickets, Backer 31879, Apr. 1904 (B); Bidaratjina, Edeling (?) s.n. (B); Tjikoja (according to Zollinger, 1854); Pesing, W. of Batavia, 5 m, on bushes in alang fields, Backer 31878, Jan. 1904 (B); id., Backer 31880, Sept. 1904 (B); Tjikao, near waterfall, Blume 1219, July (L); Kandangsapi, Korthals s.n. (L); Buitenzorg, Buitenzorg, cultivated in the Botanic Garden, n. X. F. 34a (L); X. F. 51 (L); XV. H. 16 (B); XV. H. 16 A (according to Hallier, 1896); XV. H. 24 (B, *type of var. heterophylla* Hall. f.); XV. K. B. XII. 12 (B, a specimen from Merauke, N. Guinea); Hallier C 12a, May 1893 (L); near Tjitarik, along road to Palaboeanratoe, Miss Bik s.n., Aug. 1922 (B); Priangan, Rawah Lakbok; S. of Tjikawoeng, 20 m, in bushes, many specimens, Backer 4310, Aug. 1912 (B); Cheribon, Losarang, 3 m, bank of small river, Backer 16776, Sept. 1914 (B); Pekalongan or Semarang, between Soebah and Weleri, 1 m, dike of railrod, frequent, Backer 16551, Sept. 1914 (B); Semarang, Semarang, along Banjircanal, thickets, 10 m, Docters van Leeuwen s.n., May 1910 (B); virgin forest near Kedoengdjati, 10 m, Koorders 24875β, Sept. 1896 (B, L); Djapara-Rembang, Ngarengan, 50 m, teak-wood, Koorders 35607β, June 1899 (B); Soerakarta, Horsfield s.n. (K, L; U, *type of Argyreia alulata* Miq.); Soerakarta, c. 100 m, Heinken (?) s.n. (B); Madioen, Babadan, 80 m, in hedge, Wisse 660, May 1921 (B); Malang, "in arenosis maritimis prov. Malang", Zollinger 1439 (BD); Djatiroto, 20 m, bushes, frequent, Backer 7911, May 1913 (B).

Borneo, S. and E. division, Riam arinawe, Korthals 245 (L).

Celebes, Celebes and Dependencies, without precise locality, Kjellberg 3142 and 3143 (B); near Tempé, Weber s.n. (L); Wavotobi Do., 100 m, Kjellberg 855, March 1929 (B); Manado, Tonsawang, near Loboe, 400 m, on volcanic sand, rare, Koorders 16577β, March 1895 (B, BD, L).

Soembawa, Dompoe, Zollinger 1439 (L).

Soemba, Kendara, Iboet 128, March 1925 (B, L).

Timor, without precise locality, without collector's name (BD, L, P, specimens named *Convolvulus Riedlei* Choisy); S. M. Timor, Kaslioe, Molo, c. 1350 m, Mrs. Walsh 414, May 1929 (B).

Moluccas, Ternate, Ngade, 20 m, bushes, Beguin 1150, Nov. 1920 (B); Sanoto(?) Besar, 250 m, bushes, Beguin 1551, Apr. 1921 (B, L); Kai-islands, Jaheri 173 (B); Groot Kai n. 2434 (B, from a specimen collected on Groot Kai cultivated in the Botanic Garden at Buitenzorg); Aroe-islands, beach, Warburg (according to Warburg); Timorlaoet, Riedel s.n. (K).

New Guinea, Dutch New Guinea, Merauke, Koch 27 (B, L, the specimen in L from Gouankeke); Merauke, alang-field, Versteeg 1916, Oct. 1907 (B); Territory of New Guinea, Hellwig 101, Aug. 1888 (B, BD, K); Papua, Saibai-Island, Macfarlane (according to von Mueller, 1886); near Port Moresby, Lawes (according to von Mueller, 1886); Gaima, Lower Fly River, east bank, Brass 8317, Nov. 1936 (L).

Bismarck Archipelago, New Britain (Neu Pommern), von Hügel (according to Schumann and Lauterbach, 1901); Gazelle-peninsula, Ralum, in secondary forest, Lauterbach 119, May 1890 (BD); id., native garden, Dahl 238, Aug. 1895 (BD).

Philippine Islands, according to Merrill, 1923, in the Batan Islands, in Luzon (Ilocos Norte, Bontoc, Lepanto, Union, Rizal, Laguna, Batangas), Balabac, Culion, Palawan, Cebu, Ticao and Mindanao; "common in waste places, thickets etc., at low and medium altitudes". Luzon, without precise locality, Cuming 644 (K); id., Loher 4139 (K); prov. of Ilocos Norte, Bangui, Ramos, Bur. of Sc. 27412, Febr.-March 1917 (B); Lepanto, Ramos, Bur. of Sc. 7045, Jan. 1909 (L); prov. of Union, Bauang, Elmer 5571, Febr. 1904 (BD, K); Rizal prov., Antipolo, Merrill, Spec. Blanc. 554, Dec. 1914 (B, K, L); Rizal prov., Bosoboso, Ahern's collector, For. Bur. 1999, Nov.-Dec. 1904 (B, BD, K, S); id., Manila, Merrill 5167, Febr. 1906 (BD, K); id., Manila, Merrill 650, Jan. 1903 (BD, K); prov. of Laguna, Los Baños, Robinson, Bur. of Sc. 17364, Apr. 1913 (L); Balabac, Mangubat, Bur. of Sc. 436, March-Apr. 1906 (BD); Culion, Merrill 538, Dec. 1902 (K); id., Merrill 620, Dec. 1902 (BD); Palawan, Bermejos, Bur. of Sc. 298, Jan. 1906 (BD).

Distribution: Trop. East Africa, Mascarenes, Seychelles, British India, Ceylon, Indo-China, Malaysia, trop. Australia, Polynesia; introduced in the West Indian Islands.

Vernacular names: Indian jalap; turpeth-root; aroj djotang, aroj djotang bener, aroj jutton bener, aroi djeton bener (Sund., Hasskarl, Miquel, Koorders); sampar-kidang, sampar kedong (Jav., Semarang, Koorders); sampar-kebo (Jav., Djapara-Rembang, Koorders); balaran (Jav., Backer); rajoedan (Jav., Backer); langoewi (Soembawa, Zollinger); non loli (Timor, Walsh); bangbañgau, laplapsut (Philipp.: Ilóko language, Merrill); burákan (Philipp.: Samar-Leyte Bisáya language, Merrill); kamokamotíhan (Philipp.: Tagálog language, Merrill).

Use: "The bark of the roots is by the natives employed as a purgative, which they use fresh, rubbed up with milk. About six inches in length of a root as thick as the little finger, they reckon a common dose" (ROXBURGH). See WATT, Dict. Econ. Prod. Ind. IV (1890) p. 493—496.

Remarks. The 3 numbers from Krakatau mentioned above are all without flowers. They have been provisionally placed here as I am not quite sure they really belong to the species.

2. **Operculina Brownii** VAN OOSTSTR., nov. nom. — *Ipomoea alata* R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 484; CHOISY in DC., Prodr. IX (1845) p. 369; BENTH., Fl. Austr. IV (1869) p. 418; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1060; id., Compr. Cat. Queensl. Pl. (1909) p. 347, fig. 326 on p. 350 — *Convolvulus alatus* (R. BR.) SPRENG., Syst. I (1825) p. 596, non *Operculina alata* (HAM.) URB.

Plant completely glabrous. Stems slender, twining, angular to narrow-alate, the thickest parts about 3 mm in diam. Leaves rather remote, petiolate, petiole much shorter than the blade, about 1—2 cm long; blade narrow-ovate-oblong to ovate, long attenuate to the acute or obtusish, mucronulate top, 5.5—8.5 cm long, 2—4.5 cm broad; nervation prominent beneath, pale, primary nerves 7—8 on each side of the midrib. Peduncles axillary, stout, angular to narrow-alate, 2—3.5 cm long, pedicels angular, clavate above, 1.5—2.5 cm long, much thickened in fruit. Sepals broad-elliptic to orbicular, broadly rounded at the apex, 22—25 mm long, the inner ones only slightly shorter than the others, all much enlarged in fruit, to 30 mm long. Corolla funnel-shaped, to 5 cm long (the specimen examined bears only 1 flower). Ovary globose to conical, glabrous. Disk low, annular. Capsule large, 3.5—4 cm in diam., enclosed by the large, cup-shaped calyx. Seeds dull black, 1.5 cm long.

THURSDAY ISLAND, JAHERI 490 (B); also mentioned from this locality by MANSON BAILEY. The type was collected on the islands off Cape Wilberforce (Australia, Northern Territory) by ROB. BROWN.

Distribution: Australia (N. Territory, N. Queensland).

Remarks. I believe that the American *O. alata* (HAM.) URB. (= *Convolvulus alatus* HAM.; *O. altissima* (MART.) MEISSN.; *O. pterodes* (CHOISY) MEISSN.) is a very closely related though distinct species. The materials of *O. alata* I could examine have the flowers yellow instead of white; the leaves are thinner than in the Australian species; moreover the fruits in *O. alata* are smaller and so are the seeds.

3. **Operculina Riedeliana** (OLIV.) VAN OOSTSTR., nov. comb. — *? Convolvulus bufalinus* LOUR., Fl. Cochinch. I (1790) p. 109 — *? Ipomoea bufalina* (LOUR.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 452; id. in DC., Prodr. IX (1845) p. 360 — *Convolvulus platypeltis* ZIPP. ex SPANOGHE in Linnaea XV (1841) p. 338, pro synon. — *Ipomoea*

Riedeliana Oliv. in Hook., Ic. Ser. III, V, 1 (1883) t. 1424 — *Merremia Riedeliana* (Oliv.) Hall. f. in Engl., Bot. Jahrb. XVI (1893) p. 552; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 127; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 509; Koorders, Exk. fl. Java III (1912) p. 112 — *Ipomoea petaloidea* Choisy var. *andamanica* Prain in Journ. As. Soc. Bengal LXIII (1894) p. 110 — *Merremia bufalina* (Lour.) Merr. and Rolfe in Philipp. Journ. Sc. III (1908) p. 122, quoad specim. tantum — *M. crispatula* (Wall.) Prain var. *andamanica* (Prain) Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 307 — *M. platypeltis* (Zipp. ex Spanoghe) Prain l.c. p. 307 — *Operculina bufalina* (Lour.) Hall. f. in Meded. Rijksherb. Leiden 1 (1910) p. 26, quoad specim. tantum; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 363, quoad specim. tantum.

All parts of the plant with exception of the midpetaline bands of the corolla glabrous. Stems climbing, robust, terete, to 3—5 mm in diam., reddish brown in dry specimens, more or less woody, fistulose or with pith. Leaves petiolate, petiole thin, slender, 2—10 cm long, dark brown to black in dry specimens; blade often reddish brown when dry, broad-ovate to orbicular or sometimes narrower, oblong, rarely to narrow-oblong, occasionally contracted at about the middle, more or less abruptly acuminate with sharp, mucronulate point; broad-cordate at the base (in narrow leaves the base is sometimes slightly cordate to truncate), 8—18 cm long, (3—)6.5—15 cm broad; primary nerves about 7—8 on each side of the midrib, secondary nerves parallel. Peduncles axillary, shorter or longer than the petioles, 2—11 cm long, as thick as the stems or slightly thinner, terete below, applanate upwards, 1—several-flowered; bracts oblong, 10—15 mm long, scarious, deciduous; pedicels 1—2(—3) cm long, clavate above, much thickened in fruit. Sepals about equal in length, orbicular, broadly rounded to slightly emarginate and minutely mucronate at the apex, the exterior ones leathery, the interior with broad scarious margin, 13—17 mm long, in fruit to 20 mm and then the calyx cup-shaped and enclosing the capsule. Corolla pale yellow, in young flower-buds densely sericeo-pilose; when adult widely funnel-shaped with only the midpetaline bands densely sericeo-pilose outside. Length of corolla 4—5 cm. Filaments inserted about 6 mm above the base of the corolla, their base dilated and pubescent, just as the corolla inside below their place of insertion. Ovary conical, glabrous; style filiform, about 18 mm long; stigmas globular, papillose. Capsule 2.5—3 cm in diam., with thick leathery operculum (upper part of exocarp) and scarious endocarp; seeds black, opaque, with 2 pilose-papillose edges, further glabrous, 7 mm long.

MALAY PENINSULA, Negri Sembilan, Bukit Dusun Paya, ALVINS 1181, March 1885 (S).

JAVA, Batavia, Bidaratjina, S. of Meester Cornelis, EDELING? s.n. (B); Weltevreden, Goenoeng Sahari Sentiong, 10 m, in thickets, 1 specimen, BACKER 33472, Aug. 1904 (B); Buitenzorg, Tji Sèèng, Koeripan, N.W. of Buitenzorg, 125 m, on limestone rock, many specimens, BACKER 25471, July 1918 (B); cult. in the Botanical Garden, Buitenzorg, n. B. XIII. 2, from Tandjong Priok (according to HALLIER, 1896).

CELEBES, Celebes and Dependencies, Palopo, 200 m, KJELLBERG 1957, July 1929 (B).

FLORES, Mborong, 10—50 m, edge of forest, Mrs. RENSCH 1454, July 1927 (BD, mixed with *Ipomoea alba* L.).

TIMOR, without precise locality, without collector's name (ZIPPELIUS), numbered 45/6 (L, named *Convolvulus platypetalus* ZIPP.); id., LESCHENAULT, a specimen with very narrow leaves (P, named *Convolvulus petaloideus* CHOISY var. *linearifolia* in CHOISY's handwriting).

WETAR, TREUB 543, Sept. and Oct. 1893 (B).

MOLUCCAS, Boeroe, RIEDEL, type of *Ipomoea Riedeliana* OLIV. (according to OLIVER, 1883); Kay-islands, JAHERI 172 (B).

NEW GUINEA, Papua, Lake Daviumbu, Middle Fly River, in secondgrowth rainforest, BRASS 7719, Sept. 1936 (L).

PHILIPPINE ISLANDS, according to MERRILL, 1923, in Luzon (Ilocos Norte, Union, Bataan, Rizal), in thickets and secondary forests at low altitudes; Luzon, prov. of Ilocos Norte, Bangui, RAMOS, Bur. of Sc. 2796, Febr.-March 1917 (B, K); prov. of Union, Bauang, ELMER 5622, Febr. 1904 (B, BD, L); prov .of Rizal, without precise locality, RAMOS, Bur. of Sc. 22470, March 1915 (B, K, L); id., Antipolo, RAMOS, Bur. of Sc. 2078, Jan. 1914 (B, BD, L, P, S); id., Montalban, MERRILL 5040, March 1906 (BD, L); id., Montalban, ROBINSON, Bur. of Sc. 9658, Jan. 1910 (L); id., Novaliches, LOHER 4156, Febr. 1891 (according to MERRILL and ROLFE, 1908); id., id., LOHER 4140, March 1891 (K); Cebu, RAMOS, Bur. of Sc. 11103, March 1912 (L, S).

Distribution: Indo-China (?), Malay Archipelago, New Guinea, Philippines.

Vernacular names: kangkong bukit (Malay Peninsula, ALVINS); bulakán-dágat (Philipp.: Tagálog language, MERRILL).

Use: "The leaf is made into poultice and applied to the head in cases of jungle fever" (ALVINS, Malay Peninsula).

Remarks. 1. Concerning the synonymy of this species one can give the following remarks. *a. Convolvulus bufalinus* LOUR. is a name the application of which is uncertain and must, therefore, be rejected. It has been described by LOUREIRO in his Flora Cochinchinensis, but the description is so short and incomplete that it is impossible to decide what species LOUREIRO had before him. *b.* The name *Ipomoea bufalina* (LOUR.) CHOISY is based wholly on *Convolvulus bufalinus* LOUR. and must, therefore, be rejected. *c.* The next synonym *Convolvulus platypeltis* ZIPP.

ex SPANOGHE is a name published as a synonym. *d. Ipomoea Riedeliana* OLIV. has been validly published and is the basis of our new combination.

2. Some authors (MIQUEL, BOERLAGE) misinterpreted this species as being identic with *Ipomoea petaloidea* CHOISY (= *Convolvulus crispatulus* WALL.). Through the kindness of Prof. HOCHREUTINER I had the opportunity to study the type of CHOISY, a specimen collected by WALLICH and published by this author in his Catalogue (1828) n. 1403 as *Convolvulus crispatulus* WALL., a nomen nudum. From this examination it became evident that we have to do here with a distinct species. By the absence of fruits it was, however, at first sight impossible to decide if we had to do with a species of *Merremia* or of *Operculina*. Fruiting specimens which were received on loan from the Kew herbarium by the kindness of Sir ARTHUR W. HILL, threw light on the question. It is now quite certain that *Ipomoea petaloidea* CHOISY is an *Operculina*, for which the right name must be *Operculina petaloidea* (CHOISY) VAN OOSTSTR. [1])

CHOISY himself confounded the two species too, as he mentioned a specimen of LESCHENAULT from Timor as being identic. This specimen belongs to *Operculina Riedeliana* (OLIV.) VAN OOSTSTR.

Differences between *O. Riedeliana* (OLIV.) VAN OOSTSTR. and the type of *O. petaloidea* (CHOISY) VAN OOSTSTR.:

O. Riedeliana is an entirely glabrous twiner (with exception of the corolla); it has the stems stout and terete or very slightly striate; the peduncles are as thick as the stems or slightly thinner; the leaves have thin and slender petioles; the pedicels are rather thick and clavate upwards, much thickened in fruit; the sepals are orbicular, mucronulate, 13—17 mm long, in fruit to 20 mm long, the outer ones leathery, the cup-shaped calyx has a diam. of 3—3.5 cm in fruit; the corolla is 4—5 cm long; the capsule is 2.5—3 cm in diam., with a large operculum; the seeds are 7 mm long.

In the type-specimen of *O. petaloidea* the stems are generally more distinctly striate, or very narrowly alate below the nodes, pubescent and glabrescent; the peduncles are less thick and densely pubescent; the petioles are thicker and less slender, in adult leaves with narrowly winged, undulate margins at both sides above; the pedicels are thinner, gradually thickened upwards and pubescent; the sepals are narrower, elliptic, mucronulate, 13—15 mm long, thinner and less coriaceous. Well-developed corollas and fruits are lacking in the type-specimen (see below). The leaves of the type of *O. petaloidea* are narrow-ovate to oblong, the young upper ones narrow-oblong to lanceolate; the base is rounded or truncate to slightly emarginate, the apex, as far as present, is obtuse and mucronulate; the young leaves are densely pubescent below, very slightly pubescent to glabrous above; later on the pubescence on the lower surface is much more sparse or it completely disappears. In *O. Riedeliana* the leaves are always entirely glabrous, moreover they are mostly much broader, broad-ovate to orbicular, broadly to slightly cordate at the base and more or less abruptly acuminate at the apex.

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[1]) **Operculina petaloidea** (CHOISY) VAN OOSTSTR., nov. comb. — *Convolvulus crispatulus* WALL., Cat. (1828) n. 1403, nomen nudum — *Ipomoea petaloidea* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 451, excl. specim. Timor. — *Merremia petaloidea* (CHOISY) BOERL., Handl. Fl. Ned. Ind. II (1899) p. 509, quoad nomen tantum — *M. crispatula* (WALL.) PRAIN, Bengal Pl. II, p. 730.

Some specimens of *O. petaloidea* in the Kew herbarium bear ripe fruits enveloped by the slightly enlarged, to 17 mm long, sepals; the capsules are smaller than in *O. Riedeliana,* they have a diameter of about 1.5 cm; the seeds are 5—6 mm long.

XV. DECALOBANTHUS VAN OOSTSTR.

VAN OOSTSTR. in Blumea II (1936) p. 99 and 100, fig. 1.

Plant herbaceous, glabrous, stems prostrate, slender. Leaves ovate, attenuate towards the apex, truncate or slightly retuse at the base. Inflorescences axillary, pedunculate, 1- or 2-flowered; pedicels somewhat angular, slightly thickened at the apex. Sepals large, all of the same length or the exterior ones a little shorter, ovate or elliptic, obtuse or slightly emarginate. Corolla salver-shaped, the tube fleshy, long and narrow obconical or cylindrical, attenuate to the base, nerveless; limb 5-lobed, the lobes reflexed (or patent?), small, bifid, the middle part of them thicker than the oblong, obtuse membranaceous lobules. Stamens inserted in the corolla tube, anthers oblong or ovate, sagittate at the base, filaments flattened, gradually broadened to the base. Pollen smooth. Ovary glabrous, 2-celled, the cells 2-ovuled; style filiform, entire; stigmas 2, globose, papillose. Disk cylindrical, slightly lobed. Fruit unknown.

Only one species in Malaysia:

Decalobanthus sumatranus VAN OOSTSTR. in Blumea II (1936) p. 99 and 100, fig. 1.

Herbaceous, glabrous, stems prostrate, terete, fistulose, 1—2 mm thick. Leaves petiolate, petiole shorter than the blade, 10—17 mm long;

blade ovate or narrow-ovate, gradually attenuate towards the obtusish, mucronulate apex, truncate or slightly retuse at the base, 4—6 cm long, 2—4 cm broad, more or less shining above, paler beneath than above; the midrib and 6—7 nerves on each side of it prominent on both sides, secondary nerves about parallel, tertiary nervation reticulate. Inflorescences axillary, 1—2-flowered, peduncles striate or angular, 1.5—3.5 cm long; pedicels slightly angular, thickened at the apex, 10—15 mm long. Sepals to 19 mm long, all of the same length or the exterior ones a little shorter, concave, 2 exterior ones ovate, slightly emarginate, indistinctly mucronulate, coriaceous; 3 interior ones elliptic, slightly emarginate, indistinctly mucronulate, coriaceous, scarious at the margin. Corolla yellow, salver-shaped, the tube long and narrow obconical or cylindrical, attenuate to the base, fleshy, to 2.5 cm long, the limb 5-lobed, the lobes small, reflexed (or patent?), bifid, the middle part of them thicker than the oblong, obtuse, slightly unequal, about 5—5.5 mm long, striate lobules. Filaments about 5 mm long, flattened, gradually broadened towards the base, glabrous or papillose in the basal part, inserted about 6.5 mm above the corolla base; anthers oblong or ovate, 6 mm long, shortly sagittate at the base. Ovary 2-celled, conical, glabrous; each cell with 2 ovules. Style filiform, to 16 mm long; stigmas 2, globose, papillose. Disk cylindrical, 1.25 mm high, slightly lobed. Fruit unknown.

SUMATRA, Djambi, near Bangko, along road to Kerintji, 60 m, open sunny place on weathered tuff, July 1925, POSTHUMUS 571 (B, *type*).

Distribution: Sumatra.

Vernacular name: Akar tanah (Djambi, POSTHUMUS).

NITELLA MADAGASCARIENSIS, NOV. SPEC., WITH NOTES ON THE CHAROPHYTA OF MADAGASCAR

by

J. S. ZANEVELD

(Rijksherbarium, Leiden)

(Issued June 15, 1939).

Our knowledge of the Charophyta of Madagascar is mainly based on the rich and well-prepared collection made by Mr TH. B. BLOW, who visited the eastern central part of the island in the early months of 1924[1]). The 384 dried specimens and a considerable number of portions of the plants preserved in formalin were determined by the well-known authority on the Charophyta, the late JAMES GROVES, who published the results of his work in the Journal of the Linnean Society (Botany), vol. XLVIII, 1928. This paper contains the descriptions of 5 new species and 3 new varieties of *Nitella.*

Before this basic paper on the Charophyta of Madagascar was published, only very few publications appeared. As far as I know the first Madagascarian species to be recognized was "*Chara ceylonica* WILLD.", described by BOJER in the "Hortus Mauritianus" (1837, p. 427). The specimen was not seen by BRAUN, but he placed it in his large species *C. gymnopus* as subspecies *C. Commersonii* (1868, p. 872). BRAUN also states in the same work (l.c., p. 785) that he saw another specimen from Madagascar collected by GOUDOT, but did not mention it elsewhere in "Die Characeen Afrika's", nor has he cited the two specimens in his "Fragmente zu einer Monographie der Characeen" (1882). Though the latter work forms the starting point for the study of the Charophyta of almost every country all over the world, the name Madagascar is not to be found in it.

In a note to BAKER's "Further contributions to the Flora of Madagascar" (1887) H. & J. GROVES give the description of the first, and at the same time new *Nitella*-species from this island, named after his collector *N. Baronii*[1]). After GROVES's work in 1928 only one paper appeared containing notes on Madagascarian Charophytes, viz. part II of "New and noteworthy South African Charophyta" (1933) in which GROVES and Miss STEPHENS describe two more new *Nitella*-species, collected already in 1879—'80 by J. M. HILDEBRANDT.

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[1]) A brief account on the Charophyte collecting tours of Mr BLOW is given by ALLEN (1938).

The present paper primarily deals with the description of a new *Nitella*-species, which was collected at the end of the foregoing year. Further a review in key-form of all described Charophyta of Madagascar is given, followed by a table with some additional remarks showing the geographical distribution and relationship. Finally some few general conclusions are drawn concerning the character of these species and the way in which they possibly entered Madagascar.

Nitella madagascariensis, n. sp.

(Figs. A—E).

Latin diagnosis.

Planta monoecia, alopecuroidea, usque ad 7 cm alta, aeneovirescens. *Caulis* tenuissimus, ad 350 μ diam.; *internodia* in partibus inferioribus ramulis aequalia, in partibus superioribus $^1/_2$—$^2/_3$ ramulorum longitudinis. Verticillorum *ramuli steriles* normaliter 6, rigidi, c. 1 cm longi, 3—4-plo-furcati; radii primarii $^2/_5$ totius longitudinis ramulorum; radii secundarii 3; radii tertiarii 2—3 quorum saepe 1 in radios 2 quaternarios furcati; omnes radii inaequales primariis exceptis; ramuli accessorii in omnibus verticillis. Verticillorum *ramuli fertiles* 6, conferti, gymnocephali, c. 0.7 cm longi, 3-furcati; radii primarii dimidio longitudinis ramulorum breviores; radii secundarii 3—4; radii tertiarii 2—3; radii quaternarii generatim 2. *Dactyli* ramulorum sterilium eis fertilium similes, longitudine inaequales, 2—3-cellulati; cellula inferior elongata, apice truncata, obtuse emarginata, ad 150 μ diam.; cellula centralis $^2/_3$ latitudinis inferioris, apice erecta; cellula ultima conica, 60—100 μ longa, 30—45 μ lata, acutissima, saepe delapsa. ♂ et ♀ *gametangia* in omnibus nodis liberis. *Antheridia* terminalia, plerumque solitaria rarissime geminata, plerumque breviter pedicellata vel subsessillia, c. 340 μ diam. *Oogonia* sessilia, lateralia, plerumque geminata, si solitaria antheridio conjuncta, constanter 500—510 μ longa (coronula incl.), 350—365 μ lata, cellulis spiralibus 7 (6—8), apices versus elongatis et bulbosis; coronula 75—90 μ alta, ad basin 65—80 μ lata; oosporae 275—325 μ longae, 270—295 μ latae, striis 6 (5—7); *oosporae membrana* translucens, pallide brunnea, anguloso-reticulata.

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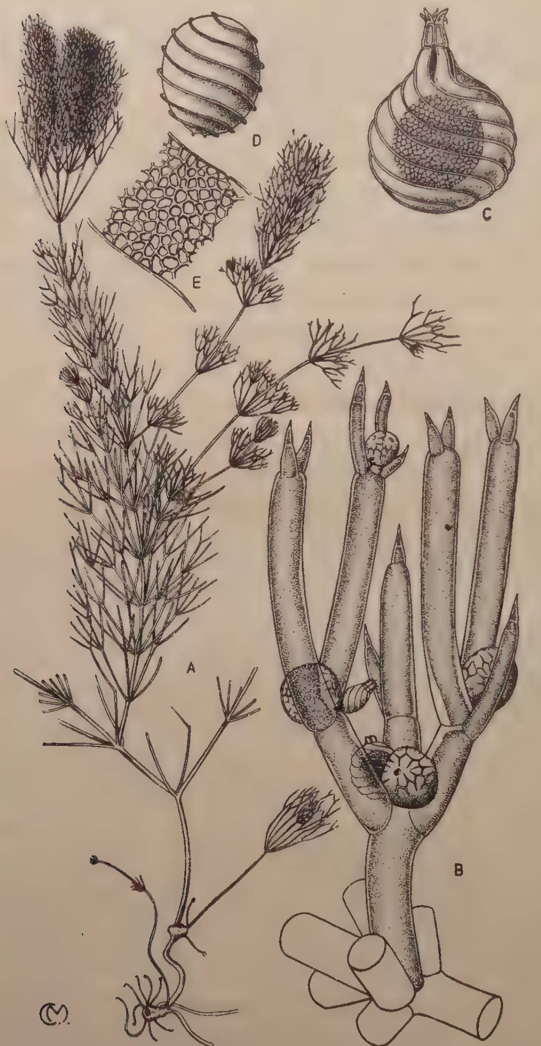
[1]) In consequence with the international rules I write *"Baronii"* instead of *"Baroni"*.



Nitella madagascariensis ZANEV., nov. sp. — A. habit, × c. 2; B. base of fertile whorl with one entire branchlet, × c. 12; C. immature oogonium showing the interstices for the penetrating spermatozoids, × c. 60; D. ripe oospore, × c. 55; E. part of the oospore membrane with decoration, × c. 460 (from the type material).

Description.

Plant monoecious, bronze green, not more than 7 cm in height, with a fox-tail-like habitus, several branched stems rising from the same swollen node which is connected with other thickened nodes by means of colourless one-celled internodes, these swollen nodes and colourless internodes most probably forming together a kind of creeping rhizome. *Stem* very slender, up to 350 μ in diam.; *internodes* in the lower parts of the plant as long as the branchlets, in the upper parts $^1/_2$—$^2/_3$ the length of the branchlets. *Sterile branchlets* usually 6 in a whorl, somewhat spreading and rigid, c. 1 cm long, twice and partially thrice-furcate; primary rays $^2/_5$ the length of the entire branchlet; secondary rays 3; tertiary rays 2—3 of which one is frequently again forked with 2 quaternary rays; all rays with exception of the primary are very unequal in length; the lower whorls only consisting of sterile branchlets; in nearly every whorl one new young, short shoot. *Fertile branchlets* usually 6 in a whorl, crowded, not enveloped in a mucous cloud, forming long dense, somewhat rigid plumes, 0.7 cm long; all branchlets thrice-furcate; primary rays shorter than half the length of the entire branchlet; secondary rays 3—4; tertiary rays 2—3; quaternary rays usually 2; all rays varying in length, especially the ultimate ones. *Dactyls* (ultimate rays) in the sterile and fertile branchlets 2—3, similar, very variable in length, 2—3-celled; basal cell much elongated, up to 150 μ in diam., truncate at apex and there with rounded margins; penultimate cell $^2/_3$ the breadth of the basal cell, either very short or somewhat shorter than the basal one, truncate at apex; ultimate cell conical, at the base as wide as the penultimate cell, very acute, 60—100 μ long, 30—45 μ wide at base, very often broken off; the cell-lumen everywhere at the same distance from the outer part of the cell-wall, except at the top which shows a hyaline part. ♂ and ♀ *gametangia* present at all and at the same nodes, lacking at the base of the whorls; the younger fertile whorls, however, containing mainly antheridia. *Antheridia* solitary or very seldom geminate, sessile or short-stalked, terminal; on the younger whorls, however, apparently laterally inserted because they are pressed aside by the force of the young rays; c. 340 μ in diam. *Oogonia* frequently geminate, sometimes solitary, but then always together with an antheridium; laterally inserted at the nodes, especially at the lower ones; very constantly 500—510 μ long (incl. coronula), 350—365 μ wide with 7 (sometimes 6 or 8) broad spiral cells, which are very much elongated and swollen below the coronula, and at this spot showing interstices of c. 65 μ length and 20 μ width for the admission of the spermatozoids; *coronula* 75—90 μ high, 65—80 μ wide at base; in the mature oogonium the inferior series of cells less than half the length of the upper cells, c. 25 μ high, superior series of cells typical crown-like, individual cells diverging, c. 60 μ high; ripe *oospore* bright yellow brown, nearly globose, 275—325 μ long, 270—295 μ wide, with 6 (sometimes 5 or 7) prominent, broad striae; *outer membrane* very thin, translucent, tough, light yellow brown, angularly reticulate with a protuberance on each point of junction, showing about 10—12 meshes between the ridges.

Exsiccatae.

Type collected in stagnant water in the vicinity of the Simianona-falls about 3 km west of Ambahoabe, distr. Soanierana, Madagascar, c. 40 m alt., by LAM and MEEUSE, No. 5791, 6th December, 1938; dried and alcohol material in the Rijksherbarium, Leiden.

LAM & MEEUSE No. 5792 is collected in a little tributary at about 1 km west of Ambahoabe, same date, c. 35 m alt.; dried material only, in Rijksherb. Leiden.

Vernacular name: lomotra. This word, however, is also used by the natives for mosses (cf. lumut, Malay).

Remarks.

Nitella madagascariensis is at first sight characterized by its fox-tail-like habit (fig. A), particularly with regard to the specimens preserved in fluid, and therefore it may be easily recognized in the field. The other characteristics of the new species are the dactyls being partly two and partly three-celled (fig. B), whereas only the ultimate cell has a nearly uniform size. The spiral cells enveloping the oosphere are enormously elongated just before fertilization, immediately below the lower cell-series of the coronula (fig. C); by the force of this elongation the spiral cells are opened at their apices, thus forming long channels serving for the penetration of the spermatozoids. At this phase of development the upper series of coronula cells forms a distinct crown by the divergency of the individual cells. As soon as the oogonium has been fertilized, the spiral cells close, and the upper row of coronula cells is then less crown-like.

The description of *N. inaequalis* J. GROVES (1928, p. 127) bears some resemblance to that of *N. madagascariensis.* The outstanding features of the former species are: the dactyls partly one, partly two-celled; frequently occurring clusters of one-celled dactyls at the second and third branchlet nodes; conspicuously contracted base of the ultimate cell. None of these characters are to be found in the present species, in which, moreover, the dimensions of both antheridia and oogonia are smaller. The following characteristics are common to both species: the unequal length and complexity of the rays, which, however, in *madagascariensis* are never curved at their base, and the marked elongation of the spiral cells of the oogonium.

Through the kindness of the director of the Kew Herbarium I had the opportunity to study the only specimen of *N. inaequalis* extant there. The species may indeed be immediately distinguished by the remarkable superior cell of the dactyls which is contracted at the base, and less broad than the inferior cell. The hyaline part of the cell-wall of the upper cell in *N. inaequalis* has the same thickness everywhere, whereas in *N. madagascariensis* it is considerably thicker towards the apex than in other parts. These considerations made me conclude to keep the LAM & MEEUSE material separate from *N. inaequalis*, and to describe it as a new species, also on account of the differences with other allied species to be mentioned underneath.

In the bi to three-celled group *N. madagascariensis* is closely allied to *N. heteroteles* GROVES & STEPHENS of which I studied the type, extant in the Kew Herbarium. This plant has quite another habit, being very slender and probably very large, with elongate rays; its size cannot be stated with certainty as the specimen is badly preserved. Other differences are to be found in all parts of the plant. The primary rays are $^1/_3$ the length of the total branchlet, being c. 2 cm long; all other rays are nearly of equal length, and the primary ray is often the shortest one. *N. madagascariensis*, on the other hand, has a tufted habit, the branchlets being short and compact, and up to 1 cm long. The inferior cell of the dactyls is much shorter than in *N. heteroteles* where it often reaches a length of 5 mm. The length of the oogonia given by GROVES & STEPHENS (1933, p. 277) as about 500 μ long, the coronula exclusive, seems to be a little too high: I found the oogonia but very rarely longer than 425 μ! The ripe oospores are c. 300 μ long, i.e. 270—320 μ, and in by far the most cases less than 300 μ. The spiral cells never show the lengthening, so remarkable for the new species, and the number of convolutions is always higher, as may be seen in the key below. The different size of the antheridia is also of importance for the determination of the two species.

Though *N. madagascariensis* shows some similarities with *N. mucronata* (A. BR.) MIQUEL and varieties, it is at once distinguishable by the size and the shape of the dactyls, by the size and the colour of the gametangia, and by the number of striae. Particularly when the ultimate cell or cells of the dactyls are broken off the inferior cell shows the characteristic truncate, obtusely margined apex.

The taxonomical place and the relationship of *N. madagascariensis* among the species already known from Madagascar may be expressed in the following key, which at the same time, may serve as a conspectus of the species thusfar known.

Keys to the Charophyta of Madagascar.

(Madagascarian genera and species are in heavy type).

Key to the Sections and Genera.

Cells of coronula in two superimposed series of five cells each; stem and branchlets ecorticate; branchlets usually furcate . . . . NITELLEAE

Antheridia terminal in the furcations of the branchlets; oogonia lateral; oospore elliptic in transverse section; monoecious or dioecious . . . . . **Nitella**

Antheridia and oogonia lateral at the branchlet nodes; oospore terete in transverse section; sterile branchlets not furcated; fertile branchlets forked with continuous axis; monoecious or dioecious (not yet collected in Madagascar) . *Tolypella*

Cells of coronula in one series of five cells; stem and branchlets corticate or ecorticate; branchlets never furcate . . . . CHAREAE

Stipulodes absent; bract-cells 1—2 at a node, very long; branchlets consisting of 2—3 very long segments; dioecious, oogonia and antheridia lateral; ecorticate (not yet collected in Madagascar) . . . . *Nitellopsis*

Stipulodes and bract-cells present

Antheridium situated above the oogonium; monoecious; ecorticate (not yet collected in Madagascar) . . . . *Lamprothamnium*

Antheridium situated at each side of one oogonium; monoecious; ecorticate or corticate (not yet collected in Madagascar) . . . . . *Lychnothamnus*

Antheridium situated below the oogonium; monoecious or dioecious; ecorticate or corticate . . . . **Chara**

Note.

FILARSZKY (1937, p. 490) has described another genus from Western Australia, i. e. *Charina* F. et G. O. ALLEN, and though Mr ALLEN's name is included as an author, he did not see the description before it was published. As the description is only based on vegetative parts of a plant mounted on a microscopical slide, nothing can be said regarding the situation of the gametangia which procure important features for the classification of the genera. It is much to be hoped that an emendation of the description shall be given by Mr ALLEN, without which nothing can be said with certainty as to the systematical place and validity of this genus.

Key to the species of **Nitella** AG. 1824. (emend. LEONH. 1863) [1] [2].

Each whorl of branchlets consisting of a single uniform series . . . . . HOMOEOCLEMAE

Dactyls (= ultimate rays) each consisting of a single cell . . . . . *ANARTHRODACTYLAE*

Oogonia 1—3 together, sessile; oospore membrane imperfectly reticulate; antheridium solitary, sessile; branchlets once furcate with long acuminate points; secondary rays 2—4 . . . . **1. N. acuminata**

Dactyls partly one and partly two-celled . . . . . . *HETERODACTYLAE*

Oogonia 1—2 together; spiral cells elongated at the apex; oospore membrane angularly reticulate; antheridium solitary, sessile; branchlets once to thrice furcate; ultimate cell of dactyls conical, contracted at the base; secondary rays 4—5 . . . . **2. N. inaequalis**

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[1] All species hitherto found in Madagascar are monoecious.

[2] The nomenclature of smaller groups within the genus seems to need revision. I hope to deal with this matter in a next paper.

Dactyls each consisting of two or more cells . . . . . . *ARTHRODACTYLAE*

Dactyls always two-celled . . . . BICELLULATAE

Dactyls not much abbreviated (*macrodactylous type*); oogonia solitary

First free node of branchlets fertile

Young fertile whorls not enveloped in mucus (*gymnocephalous type*)

Branchlets 2—3 times furcate; secondary rays 3—4; penultimate cell of dactyls narrowed into a distinct neck forming with the apical cell a pronounced mucro; oospore c. 280 μ long; oospore membrane irregularly nodose-reticulate; antheridium c. 275 μ in diam. . . . **3. N. ogivalis**

Branchlets 3—4 times furcate; secondary rays 6—7; penultimate cell of dactyls very thin (less than 25 μ in diam.), apical cell very long and slender; oospore 200—250 μ long; oospore membrane finely reticulate; antheridium c. 175 μ in diam. . . . . **4. N. tenuissima var. callista**

Young fertile whorls enveloped in mucus (*gloeocephalous type*)

Oospore membrane angularly coralloid-reticulate; branchlets 3—4 times furcate; secondary rays 5—6; antheridium c. 350 μ in diam.; ♂ and ♀ gametangia not produced at the same node . . . . **5. N. Blowiana**

Oospore membrane interruptedly granulate; branchlets 2—3 times furcate; secondary rays 4—6; antheridium c. 275 μ in diam.; ♂ and ♀ gametangia not produced at the same node . . . . **6. N. vermiculata**

First free node of branchlets sterile

♂ and ♀ gametangia never produced at the same node; oospore membrane imperfectly reticulate (?); branchlets 3—4 times furcate; secondary rays 7; oogonium 530 μ long; oospore with c. 9 inconspicuous striae . . . . **7. N. Baronii** [1])

♂ and ♀ gametangia at the same node; oospore membrane finely granulate; branchlets 2—4 times furcate; secondary rays 7; oospore with 7—8 prominent striae, 275—400 μ long . **8. N. leptodactyla var. megaspora**

Dactyls much abbreviated (*brachydactylous type*); oogonia clustered

Upper cells of coronula twice or more as long as the lower ones; oogonia clustered, showing 6 prominent striae; branchlets 1—3 times furcate; secondary rays 3—6; oospore membrane reticulate . . **9. N. furcata**

Dactyls indifferently two and three-celled

Young fertile whorls not enveloped in mucus (*gymnocephalous type*); oospore less than 325 μ long

Dactyls more two than three-celled; antheridium c. 275 μ in diam.; oogonia solitary

All free nodes fertile; oospore with 8 broadly flanged striae, warm dark brown; membrane finely reticulate; branchlets 2—3 times furcate; secondary rays 3—4, penultimate cell of dactyl rounded at the apex . . . . **10. N. mucronata var. mobilis**

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[1]) Cf. footnote 1 on p. 373.

First free node sterile; oospore with 7—8 thin striae, light golden yellow; membrane finely reticulate; branchlets 2—3 times furcate; secondary rays 5—8 (?); penultimate ray of dactyl tapering at the apex . . . . **11. N. graciliformis**

Dactyls as much two as three-celled; antheridium more than 340 μ in diam.; oogonia geminate

All free branchlet nodes fertile; oospore 275—325 μ long with 6 broad striae, bright yellow brown; membrane angularly reticulate; antheridium frequently not at the first free node, c. 340 μ in diam.; branchlets 2—3 times furcate; secondary rays 3—4; penultimate cell of dactyl straight at the apex, variable in length; apical cell conical, not much varying in length, at the base as wide as the penultimate cell . . . . **12. N. madagascariensis**

First free branchlet-node sterile; oospore 270—320 μ long with 8 flanged striae, dark brown; membrane finely and regularly reticulate; antheridium not at the third free node, c. 375 μ in diam.; branchlets 2—3 times furcate; secondary rays 4; penultimate cell of dactyl rounded at the apex; apical cell extremely variable in size, conical . **13. N. heteroteles**

Young fertile whorls enveloped in mucus (*gloeocephalous type*); oospore 325—400 μ long, membrane angularly reticulate; dactyls mostly three-celled, a few two-celled; branchlets 2—3 times furcate; secondary rays 4—5; upper two nodes sterile; oogonia 1—3 together, "frequently geminate" . . . . **14. N. sphaerocephala**

Dactyls each consisting of three to six cells (not yet collected in Madagascar) . . . . PLURICELLULATAE

Each whorl of branchlets consisting of 3 series, viz. one central longer and more compound row in the middle, and two accessory rows, one above and one below the middle-row (not yet collected in Madagascar) . . . . HETEROCLEMAE

Key to the species of **Chara** L. 1754 [1] [2].

Stipulodes in a single whorl . . . . HAPLOSTEPHANAE

Stem and branchlets entirely ecorticate (not yet collected in Madagascar) . . *ECORTICATAE*

Stem corticate, branchlets ecorticate . . . . *CORTICATAE*

Rows of cortical cells of stem as numerous as the branchlets (*haplostichous type*) - (not yet collected in Madagascar).

Rows of cortical cells of stem twice as numerous as the branchlets (*diplostichous type*)

Stipulodes as numerous as the branchlets; number of bract-cells constant . **1. C. Benthamii**

Stipulodes twice as numerous as the branchlets; number of bract-cells variable . . . . **2. C. gymnopitys**

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[1] All species hitherto found in Madagascar are monoecious.

[2] Cf. note 2 on page 378.

Rows of cortical cells of stem thrice as numerous as the branchlets (*triplostichous type*)

Stem corticate, branchlets corticate except the lowest segment (in *C. hydropitys* the stem cortex is sometimes diplostichous) . . . **3. C. hydropitys**

Stipulodes in a double whorl . . . . DIPLOSTEPHANAE

Rows of cortical cells of stem as numerous as the branchlets (not yet collected in Madagascar) . . . . *HAPLOSTICHAE*

Rows of cortical cells of stem twice as numerous as the branchlets . . . *DIPLOSTICHAE*

Secondary cortical cells more prominent than the primary; spine-cells situated in furrows, solitary; posterior bract-cells rudimentary . . . **4. C. vulgaris**

Rows of cortical cells of stem thrice as numerous as the branchlets . . . *TRIPLOSTICHAE*

Lowest segment of branchlets corticate . . . . PHLOEOPODES

Cortical cells on branchlets twice as numerous as the bract-cells; lowest branchlet segment moderately long

Stipulodes and spine-cells rudimentary; antheridia c. 500 μ in diam. . . **5. C. fragilis**

Stipulodes and spine-cells well developed; antheridia 325—350 μ in diam. . **6. C. pseudo-brachypus**

Cortical cells on branchlets thrice as numerous as the bract-cells; lowest branchlet segment very short; stipulodes and spine-cells elongated, acute . **7. C. brachypus**

Lowest segment of branchlets ecorticate. . . . . GYMNOPODES

Cortical cells on branchlets thrice as numerous as the bract-cells; stipulodes and spine-cells elongated, acute . . . . **8. C. zeylanica**

Geographical distribution.

Concerning the distribution of the Madagascarian (and three allied) Charophyta the following table may give a survey.

Species \ Continents	Eur.	Asia	Amer.	Aust.	Afr.	Madag.	Notes
Nitella							
1. *acuminata* A. BR. 1849		+	+		+	+	
2. *inaequalis* J. GROVES 1928						+	
3. *ogivalis* GROVES & STEPHENS 1933						+	
4. *tenuissima* (DESV.) KÜTZ. 1843	+	+	+		+		
var. *callista* J. GROVES 1928						+	
5. *Blowiana* J. GROVES 1928						+	

Species \ Continents	Eur.	Asia	Amer.	Aust.	Afr.	Madag.	Notes
6. *vermiculata* J. GROVES 1928						+	
7. *Baronii* H. & J. GROVES 1887						+	cf. footnote 1 on page 373
8. *leptodactyla* J. GROVES 1922		+¹)					¹) Ceylon only
var. *megaspora* J. GROVES 1928						+	probably a separate species
9. *furcata* AG. 1824		+	+	+		+	
10. *mucronata* (A. BR.) MIQUEL 1840	+	+	+		+		
var. *mobilis* J. GROVES 1928						+	
11. *graciliformis* J. GROVES 1928						+	
12. *madagascariensis* ZANEV. 1939						+	
13. *heteroteles* GROVES & STEPHENS 1933						+	
14. *sphaerocephala* J. GROVES 1928						+	
Chara							
1. *Benthamii* A. BR. 1868		+		+		+	distribution doubtful
2. *gymnopitys* A. BR. 1852		+	+	+	+	+	
3. *hydropitys* REICHB. 1834		+	+		+	+	
4. *vulgaris* L. 1753	+	+	+	+	+	+	
5. *fragilis* DESV. 1810	+	+	+	+	+	+	
6. *pseudo-brachypus* GROVES & STEPHENS 1926					+	+	
7. *brachypus* A. BR. 1849		+		+	+	+	
8. *zeylanica* WILLD. 1803		+	+	+	+	+	

The table and the keys show that Madagascar possesses in total 14 species of *Nitella* and 8 species of *Chara*, whereas no representative of the other genera have thusfar been found. The Charophyta have 3 genera which are cosmopolitan, two of which are extant in the island.

Of the genus *Chara* none of the species is endemic, whereas the genus *Nitella* has 9 endemics, and moreover, 3 varieties restricted to this particular area only. To the variety *megaspora* of *N. leptodactyla*, a species which is only recorded from Ceylon, GROVES (1928, p. 132) remarks: "With some doubt I place this series of plants under *N. leptodactyla.* Though showing a considerable range of variation they do not seem to differ in any important point, ..." The differences enumerated thereafter show that the variety *megaspora* is as much distant from *N. leptodactyla* var. *typica* as *N. pseudoflabellata* or *N. mucosa* from *N. mucronata.* Therefore it would probably be justified to consider it a separate species, in which case the number of endemic species would be 10.

N. tenuissima and *N. mucronata* to which belong the other endemic varieties referred to above, are distributed in four of the five continents, Australia excepted. The two not-endemic *Nitella*-species occur in three continents, viz. *N. acuminata* in Asia, America and Africa, and *N. furcata* in Asia, America and Australia. Possibly the last-named species is more widely distributed, as it may have been overlooked, being cited under different names.

The same wide geographical distribution is also found in the *Chara*-species of Madagascar. *C. vulgaris* and *C. fragilis* are cosmopolitan, *C. gymnopitys* and *C. zeylanica* are widely distributed in the tropics and subtropics, lacking in Europe. *C. hydropitys* has nearly the same area as the preceding species, but is not recorded from Australia. *C. brachypus* is found in several tropical localities of the old-world only, and is not extant in Europe and America, *C. pseudo-brachypus* is only recorded from the type localities, i.e. Natal and Southern-Rhodesia. As to the distribution of *C. Benthamii* I may remark that the opinions differ considerably with regard to the differences of the last-named species towards *C. gymnopitys,* which have probably often been confused; their distribution is therefore more or less doubtful.

Discussion.

Surveying the whole I may give some additional remarks.

The present find adds another species to the group, which forms a link between the Bicellulate and Pluricellulate-groups of J. GROVES's section Arthrodactylae (GROVES, 1935). In Madagascar there is only one member of the Anarthrodactylae, viz. *N. acuminata.* The Pluricellulate-group — BRAUN's section Polyarthrodactylae (1868, p. 797) — is not represented in Madagascar, whereas to the group of the Bicellulatae, which have the ultimate rays strictly two-celled, belong most of the Madagascarian members of the genus *Nitella,* viz. 5 endemic species and 2 varieties (cf. key). The other species are to be classified in such a way that the number of cells composing the ultimate rays (dactyls) gradually increases. Starting with *N. mucronata* var. *mobilis* and *N. graciliformis* which have the dactyls frequently two and rarely three-celled, there are two species with as many two as three-celled dactyls, viz. *N. madagascariensis* and *N. heteroteles*, whereas finally in *N. sphaerocephala* the three-celled dactyls seem to represent the normal condition, as from the 112 dactyls examined by GROVES (1928, p. 131) 98 were three-celled, and only 14 two-celled. As has already been stated, species with more than three-celled dactyls do not occur in Madagascar, and though they are widely distributed in four continents, monoecious species are not yet recorded from Asia.

In connection with the foregoing some more particulars may be added. Whereas the Madagascarian Bicellulatae are invariably one to four times furcate, the number of furcations in the group with two and three-celled dactyls is always two to three. The number of secondary rays in the latter group is usually 3 or 4, and in the Bicellulatae the variation is much greater, viz. between 3 and 7. *N. graciliformis* of the bi to three-celled group forming an exception as it has 5—8 secondary rays, but on the plate (GROVES 1928, pl. 4) this number seems to be 3 to 4 (hence the interrogation-mark in our key).

I would further point out that in the two and three-celled group all species, except *N. mucronata* var. *mobilis* ("as far as observed", GROVES 1928, p. 127) and *N. graciliformis* the oogonia are geminate, whereas all Bicellulate species have solitary oogonia (except *N. furcata*). In the last-named group the membrane of the oospore is granulate or reticulate, in the former it is always reticulate. As has been stated already above no members of the Pluricellulatae have been found in Madagascar nor representatives of the section Heteroclemae to which the cosmopolitan *N. hyalina* AG. belongs.

As to the genus *Chara* some of the larger groups are entirely lacking in Madagascar, viz. the Haplostephanae — Ecorticatae, and the Diplostephanae — Haplostichae. To the former group belongs *C. Braunii* GMEL., a species occurring all over the world, whereas the latter group has no representatives in Australia.

No endemic *Chara*-species has been recorded from Madagascar. None of the other genera *Tolypella, Nitellopsis, Lamprothamnium* and *Lychnothamnus*, of which only the first-named is cosmopolitan, are represented in the island.

It is shown in the foregoing that several of the principal sections of the Charophyta are entirely lacking, but that the groups represented in the island have, in general, a good number of species. This and the other particulars dealt with do not throw any new light on the flora of Madagascar, but merely confirms what was already known: an early isolation and a high antiquity of the island. How the immigration of the Charophyta into Madagascar possibly has taken place may be briefly stated here. As the Charophyta usually grow in rather shallow water, ranging from a few inches to a few feet deep, the distribution by means of running waters cannot be an important one, and the dispersal must be due mainly to the transport of the minute oospores by migratory water-fowl. According to RIDLEY (1930, p. 535) the distribution by means of larger animals drinking at the pools is of importance, as the oospores, little fragments of the plants or bulbils adhering to the body or feet may thus be carried to other places. The Charophyta are very fragile, and fragments of the plants grow readily, staying alive out of water for a considerable time. So I got once specimens of *Chara vulgaris* and *Tolypella nidifica* collected more than 14 days before in Corsica and transported in a cover of paper still showing the cyclosis (protoplasmic circulation). On re-immersing the specimens in water they quite recovered. Thus the dispersal by means of adhering to birds or mammals is very well possible. I do not know whether the oospores when eaten, are to be found in the excreta and are still germinative.

Madagascar is situated some 240 miles (= c. 540 km) off the East African coast, a distance which most probably can be covered by migratory birds, especially ducks, geese, etc. At any rate, however, I do not think that Madagascar has got and still gets in this way its Charophyta-flora as the number of African species would then probably be considerably higher. This suggests that the penetration of Charophyta has probably taken place in early times by means of a land connection. According to BAKER (1881) and to BARON (1890, p. 290) Madagascar was connected with the African continent, and also with Mauritius, Bourbon and the Seychelles during some part or parts or the whole of the Miocene (including the Oligocene) and the early Pliocene periods. Moreover, PERRIER DE LA BATHIE (1936, p. 142) assumes a connection with Australia in the Upper Cretaceous.

Fossil Charophyta have already been recorded from the Palaeozoic era. POTONIÉ (1901, p. 25) figures a problematic *Nitella*-like organism from the Silurian, and GROVES and BULLOCK WEBSTER (1924, p. 85) mention one find of the longitudinally flattened fruit of *Nitella* from a deposit near Moscow, considered interglacial. Other fossil remains of the genus *Nitella* are of very recent geological dates, probably on account of the fact that the fruits of *Nitella* do not develop a lime shell. Remains of *Chara*-species, however, have been recognized with certainty from the Lower Oolites of the Mesozoic. The first *Tolypella* was found in the Lower Headon Beds (Eocene) of Hordle Cliffs, and *Nitellopsis*-species only in the Pliocene (Cromer Forest Bed) (cf. GROVES and BULLOCK WEBSTER, 1924, pp. 83 and 84). No fossil representatives of the genera *Lamprothamnium* and *Lychnothamnus* have been collected as yet.

On account of the existence of fossil Charophyta of very early geological periods, I think it most plausible that the intrusion of Charophyta into Madagascar took place along the way of an isthmus. Only very few species have thus reached Madagascar, and whereas some of them may have arrived at the cost of some loss of their potentialities (LAM, 1938), others have apparently come to a rich display of forms possibly by activated latent genes [1]). This fully agrees with what has been found in the Madagascarian Charophyta where in some of the sections the characters vary very much, and in other ones they seem to have come to a standstill. In this sense I agree with BRAUN's expression (1868, p. 790): "Ein specifischer Typus kann in Wirklichkeit entweder durch eine einzige Art, oder auch durch mehrere Arten repräsentirt sein".

Literature cited.

ALLEN, G. O., 1938. The Charophyte collecting tours of THOMAS BATES BLOW. — Journ. Botany vol. 76, pp. 295—298.

BAKER, J. G., 1881. On the Natural History of Madagascar. — Journ. Bot. vol. 19 (N. S. vol. 10), pp. 327—338 and pp. 363—365.

BARON, R., 1890. The Flora of Madagascar. — Journ. Linn. Soc. (Bot.) London, vol. 25, pp. 246—294.

BOJER, W., 1837. Hortus Mauritianus, p. 427. Mamarot & Co., Maurice (*Chara Ceylonica*).

BRAUN, A., 1868. Die Characeen Afrika's. — Monatsber. Kön. Akad. Wiss. Berlin von 1867, pp. 782—872.

—— and NORDSTEDT, O., 1882. Fragmente einer Monographie der Characeen. Nach den hinterlassen Manuscripten A. BRAUN's herausgegeben von Dr. OTTO NORDSTEDT, pp. 1—211, pl. 1—7. — Abh. Kön. Akad. Wiss. Berlin 1882.

FILARSZKY, F., 1937. Determinatio Characearum Exoticarum. — Math. u. Naturwiss. Anzeiger d. Ungar. Akad. d. Wiss. Bd. 55, Budapest, pp. 476—497, figs. 1—45.

GROVES, H. and J., 1887. *Nitella Baroni*, sp. nov., in: J. G. BAKER, Further contributions to the Flora of Madagascar. — Journ. Linn. Soc. (Bot.) vol. 22, p. 537.

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[1]) In a subsequent paper on the Malaysian Charophyta to be published in this journal, I hope to refer again to this subject.

GROVES, J., 1922. On Charophyta collected in Ceylon by Mr THOMAS BATES BLOW. — Journ. Linn. Soc. (Bot.) vol. 46, pp. 97—103, pl. 4—7.

——, 1928. On Charophyta collected by Mr THOMAS BATES BLOW, F. L. S., in Madagascar. — Journ. Linn. Soc. (Bot.) vol. 48, pp. 125—137, pl. 4—7.

——, 1935. The primary divisions of the genus *Nitella*. — Journ. Bot. vol. 73, pp. 46—49.

—— and BULLOCK WEBSTER, G. R., 1920 and 1924. British Charophyta. Parts I and II. — Printed for the Ray Society, London.

—— and STEPHENS, E. L., 1933. New and noteworthy South African Charophyta. II. — Transact. Roy. Soc. S. Africa vol. 21, Part 3, pp. 271—289, pl. XIII—XVI.

LAM, H. J., 1938. Studies in Phylogeny. I. On the relation in Taxonomy, Phylogeny and Biogeography. — Blumea vol. 3, 1, pp. 114—125.

PERRIER DE LA BATHIE, H., 1936. Biogéographie des plantes de Madagascar. Jouve & Cie, Paris.

POTONIÉ, H., 1901. Die Silur- u. die Culm-Flora des Harzes u. d. Magdeburgischen. — Abh. d. k. Preuss. Geol. Landesanst. N. F. 36, p. 25.

RIDLEY, H. N., 1930. The dispersal of plants throughout the world. L. Reeve & Co., Ashford, Kent.

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MISCELLANEOUS NOTES ON LORANTHACEAE 19—24

by

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(Issued March 1st, 1940).

19. On two Loranthaceae from the Solomon Islands.

Among the indeterminate *Loranthaceae* of the Kew Herbarium, I found two specimens, belonging to different species, both collected by the Reverend R. B. COMINS in San Cristoval Island. One of them appeared to represent a new species, the other to belong to a species formerly described by me, and to give a welcome completion to the knowledge of this species.

1. **Amylotheca salomonia** DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, XVI, 1 (1936) 80.

To the description may be added: Adult flowers up to 55 mm long. Unripe fruits roundish-ellipsoid, broadely truncate, with slightly vaulted disc and very short style rest.

Solomon Islands, San Cristoval, X 1890, COMINS 160 (K), climber like 159, leaves opposite, flowers yellow, fruit; vern. name: *surumoru.*

2. **Sogerianthe trilobobractea** DANSER, n. sp. — Fig. 1, *a*—*c*.

Glabra, pedicellis bracteis calycibusque minute sed dense puberulis exceptis. Ramuli teretes, internodiis 5—7 cm longis, 1.2—2 mm diametro, nodis paulum incrassatis ad duplo dilatatis. Folia stricte opposita; petiolus 7—9 mm longus, supra basin paulum incrassatam teres, 1.25—2 mm diametro, laminam versus dilatatus et facie superiore applanatus; lamina ovata vel rotundato-ovata, 5—8 cm longa, 3—5.5 cm lata, sub basi rotundata abrupte in petiolum contracta, apice obtusa vel rotundata, nervis lateralibus utrinque 2 vel 3 incurvatis subcurvinervis, costa nervisque crassioribus supra distinctis paulum prominentibus, venis indistinctis. Flores numerosi circum nodos singuli in scrobiculis inserti; pedicelli teretes, c. 2 mm longi, basi clavatim incrassata 0.75 mm, parte superiore 0.4—0.8 mm diametro, apice bractea subamplexicauli triloba, c. 1 mm

longa, lobo mediano c. 1 mm lato, lateralibus paulo brevioribus et minus latis. Calyx tubo subcylindraceo paulum infundibuliformi, c. 2.5 mm longo, basi 1.25 mm apice 1.5 mm lato, limbo infundibuliformi vel cupulato, 0.75—1 mm longo; corolla sympetala, statu alabastri adulti 15—17 mm longa, basi rotundata, in $^3/_5$ partibus inferioribus fusiformiter inflata ad 4 vel 5 mm lata, parte superiore subclavata obtusissima, postea usque ad maximam amplitudinem divisa in lacinias 5 parte inferiore anguste triangulares, medio angustatas c. 1 mm latas, parte apicali spathulatas 1.5 mm latas crassiusculas obtusiusculas; filamenta valde dorsiventraliter applanata c. 1.5 mm longa; antherae c. 3.5 mm longae 0.6 mm latae obtusissimae dithecae, loculis 4 non septatis; stylus corollae aequilongus vel paulo brevior, a basi ad apicem vix incrassatus, apicem versus tantum 4-angulus; stigma depresse globosum, c. 0.8 mm diametro.

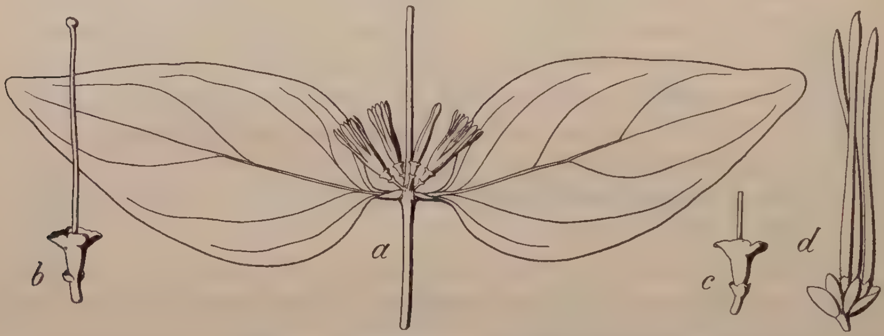

Fig. 1, *a—c*: *Sogerianthe trilobobractea* DANSER (from COMINS 159); *a*: fragment of a stem with leaves and flowers, $^3/_5$ ×; *b*: pedicel with bract, calyx, ovary, and style, $^9/_5$ ×; *c*: the same seen from the other side; — *d*: *Dicymanthes tetrapetala* DANSER, inflorescence with one triad of flowers in bud present, the other 3 flowers taken away, $^6/_5$ × (from MAYR 819).

Fructus ellipsoides vel obovatus, ad 10 mm longus 6 mm diametro, calyce persistente coronatus.

Solomon Islands, San Cristoval, X 1890, COMINS 159 (K), climbing parasite on nut trees, which it helps to kill; leaves opposite, flowers red, fruit a yellow berry containing small seeds; vern. name: *surumoru*.

I have placed this species provisorily in *Sogerianthe*, though, in some respects, it differs from all species of this genus known hitherto. Like *Sogerianthe versicolor* DANSER our new species has no scales in the corolla tube; the corolla is not 6-merous but 5-merous (I erroneously mentioned 5-merous flowers among the characters of *Sogerianthe* in the original description in Verhand. Kon. Akad. Wetensch. Amsterdam, afd. Natuurk., sect. 2, XXIX, 6, p. 106); there is, moreover, no articulation in the pedicel, nor are there 3 or 2 separate bracts at the base of the flower, but a single trilobate one. The short 5-merous corolla and the peculiar trilobate bract distinguish our species from all other *Sogerianthae.*

20. A new Amyema from Soemba (Netherlands East Indies).

Amyema polytrias DANSER, n. sp. — Plate XV, left part.

Modice robusta, omnis glabra. Stolones cylindracei, superficie inaequali, 4—5 mm diametro, passim haustoriis plantae nutrici affixa. Rami e stolonibus orientes, parce ramosi, 20—40 cm longi, teretes, prope basin 5—6 mm diametro, versus apices attenuati, internodiis inferioribus 10—15 cm longis, superioribus brevioribus, supremis saepe pauca cm tantum longis, nodis abrupte incrassatis duplo vel sesquiplo crassioribus. Folia ad 3—6 verticillata, petiolis supra basin nonnihil incrassatam subcylindraceis, laminam versus supra applanatis, 7—15 mm longis, 1—1.5 mm diametro; laminae lanceolatae vel oblongo-lanceolatae, plerumque 6—10 cm longae, 1.5—3.5 cm latae, basi cuneatae, apicem acutiusculum versus acutae vel levissime acuminatae, (in herbario) crassae, durae, fragiles, nervatura pennata, costa facie inferiore valde prominente apicem versus tenuescente, facie superiore indistincta, nervis lateralibus crassioribus utrinque indistinctis vel invisibilibus. Inflorescentiae ex stolonibus et nodis inferioribus orientes, in scrobiculis corticis insertae, singulae vel ex axillis saepe ternae, umbellae multiradiatae triadum floribus omnibus pedicellatis; pedunculi graciles, e basi nonnihil incrassata cylindracei, plerumque 16—27 mm longi, 0.5—0.75 mm diametro, apice leviter capitati; radii umbellae circiter 8, divergentes, graciles, cylindracei vel nonnihil angulati, 1.5—6 mm longi, circiter 0.25 mm diametro, apice in discum conspicuum dilatati; pedicelli plerumque 2—3 mm longi, paulo graciliores quam radii, apice nonnihil in discum dilatati; bracteae omnes ex apice pedicelli distincte unilaterales, anguste ovatae, acutae, convexae, circiter 1 mm longae. Calycis tubus anguste infundibuliformis, 2.5—3 mm longus; limbus infundibuliformis, 0.5—0.75 cm longus, integerrimus; corolla adulta plerumque 25—28 mm longa, statu alabastri adulti gracile cylindracea, vix 1 mm lata, apice distincte in clavam anguste obovatam circiter 3 mm longam 1 mm crassam, nonnihil quadriangulam, obtusiusculam incrassata, postea divisa in petala 4 omnino separata vel saepe partibus mediis et inferioribus in vittam cohaerentia, 0.5—0.75 mm lata, parte superiore circiter 5 mm longa abrupte reflexa lingulata obtusa;

filamenti pars libera circiter 4 mm longa, plana, stricta; anthera oblonga, circiter 2 mm longa, obtusissima, 4-locularis; stylus 2—3 mm longior quam corolla, a basi ad apicem fere aequicrassus, apice tantum nonnihil attenuatus; stigma vix incrassatum, obtusissimum. Fructus ignotus.

Amyema polytrias is so closely allied to *A. celebica, A. basilanensis,* and *A. anisomeres,* that one would be inclined to consider them as local forms of one polymorphous species. They all have the same mode of growth, the same arrangement and structure of the inflorescences and flowers, the same leaf-shape, and same texture of the lamina, and they are all entirely glabrous. *Amyema polytrias* shows the largest differences from the main species, *Amyema celebica,* by nearly 8-rayed umbels, whereas all other species above mentioned have 4-rayed umbels. To this may be added a number of minor differences: *A. celebica* has the leaves opposite or scattered, rarely verticillate, and as a consequence the nodes are less thickened; its inflorescences are somewhat smaller and less robust, its bracts are more obtuse, its corollas usually longer, 27—35 mm, and 5-merous, its stigma is more distinctly thickened. *Amyema basilanensis* shows nearly the same differences from *A. polytrias,* but has its leaves more often scattered, its inflorescences still smaller (peduncles 2—6 mm long), its corollas shorter (nearly 17 mm long), again 5-merous, the reflexed part of the petals only 3 mm, the filaments only 0.5 mm, the anthers 2.5 mm long. *Amyema anisomeres* differs from *A. polytrias* by its usually scattered, rarely opposite, leaves, its smaller inflorescences, the middle flowers of the triads sessile, the bracts more obtuse, the corollas 19—20 mm long, partly 4-merous, partly 5-merous, the filaments only 1.5 mm, the anthers only 1 mm long.

Type specimen of *A. polytrias*:

Island Soemba, Kanangar, 21 VII 1938, GREVENSTUK 212 (B), flower with red tube and green lobes.

21. A new Notothixos from Mergui (Lower Burma).

Notothixos merguiensis DANSER, n. sp. — Plate XIII, right part.

Modice gracilis pro genere, multoties pseudo-di-trichotoma. Indumentum in omnibus partibus iuvenilibus densum, nonnihil floccosum, ex aureo ochraceum, in foliorum facie superiore mox deciduum, in caulibus et foliorum facie inferiore diu persistens denique tenuescens, in inflorescentiis, floribus fructibusque semper floccosum. Internodia iuvenilia teretia striata, 0.75—1.5 mm diametro, apice circiter sesquiplo latiora, denique crassiora minusque dilatata, in parte plantae florente 1.5—2.5 cm longa, in parte inferiore (quoad nota) ad 4.5 cm longa. Folia stricte opposita, petiolo 3—5 mm longo, supra basin tereti, laminam versus nonnihil dilatatus et distincte canaliculatus; lamina rotundato-ovata, plerumque suborbicularis apicem obtusum versus breve acuminata, 1.5—3.5 cm longa, 1—3 cm lata, basi rotundata, tenuiter coriacea, facie superiore costa, nervis lateralibus 2 maioribus, et venis reticulatis distinctis, leviter prominentibus, inter eas leviter bullata, facie superiore nervatura indumento fere invisibili. Inflorescentiae terminales in bifurcationibus caulium, spicae triadum decussatarum (sect. *Ixostachys*), ad 2.5 cm longae, paribus triadum ad 7, quarum inferiores remotae, superiores confertae; dispositio florum femineorum et masculorum indistincta, alabastri superiores globosi (probabiliter masculi), indumento incluso ad 1 mm diametro, feminei denique fructus ellipsoides proferentes perigonio 4-mero persistente, disco subplano, et stylo brevi cylindraceo coronatos, valde iuveniles tantum notos.

Closely allied to all other species of the section *Ixostachys*, most closely to *Notothixos sulphureus*, but as much different from this as this from its allies, in its thinner, acuminate, distinctly veined leaves. Perhaps all species of the section are only local forms of one polymorphous species.

Type specimen:

Burma, South Tenasserim, Mergui District, Leikpok Chaung, 400 ft alt., 1925/26, Mr. BRAYBON's collector 201 (DD).

22. The synonymy of the Philippine Lepidellae.

In the Philippine Journal of Science, 58, I mentioned, as indigenous to the Philippines, two species of the genus *Lepidaria, viz., Lepidaria Williamsii* (MERRILL) DANSER (p. 57), and *Lepidaria tetrantha* (MERRILL) DANSER (p. 58). On p. 60—61, I moreover mentioned *Lepidaria quadriflora* VAN TIEGHEM, based on CUMING's no. 1171, and *Lepidaria biflora* VAN TIEGHEM, based on CUMING's no. 1174, both from the Philippines and both inadequately known, remarking that the numbers, given by VAN TIEGHEM, probably were incorrect, and had to be CUMING 1971 and 1974, a supposition that later proved to be correct. Of these numbers I had, at that time, only seen the latter, but *Lepidaria biflora*, probably based on this, being a nomen nudum, it had no influence upon the nomenclature of the two species mentioned.

In April 1938, however, I had the opportunity of studying, in the Kew Herbarium, both the numbers 1971 and 1974 of CUMING, and from this it appeared, that both were specimens of *Lepidaria Williamsii.* Now VAN TIEGHEM's name *Lepidaria quadriflora* cannot be considered as a *nomen nudum*, and this causes the necessity of a nomenclatorial change.

In Blumea, II, p. 37, I transferred the species in question to VAN TIEGHEM's genus *Lepidella*, and now I wish to maintain this standpoint. The synonymy of the Philippine *Lepidellae* consequently must be as follows.

1. **Lepidella quadriflora** (VAN TIEGHEM) DANSER — *Lepidaria quadriflora* & *Lepidaria biflora* (*nomen*) VAN TIEGHEM, in Bull. Soc. Bot. Fr., 42 (1895) 441; *Loranthus Williamsii* MERRILL, in Phil. Journ. Sc., 4, bot. (1909) 148; *Chorilepis quadriflora* & *Chorilepis biflora* VAN TIEGHEM, in Compt. rend. Ac. Sc., Paris, 153 (1911) 1196, 1198; *Lepeostegeres Williamsii* MERRILL, Enum. Phil. Fl. Pl., 2 (1923) 102; *Lepidaria Williamsii* DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, X, 3 (1929) 322; *Lepidella biflora, Lepidella quadriflora, Lepidella Williamsii* DANSER, in Blumea, II, 2 (1936) 37.

2. **Lepidella tetrantha** (MERRILL) DANSER — *Loranthus tetranthus* MERRILL, in Phil. Journ. Sc., bot., 7 (1912) 79; *Lepeostegeres tetranthus* MERRILL, Enum. Phil. Fl. Pl., 2 (1923) 101; *Lepidaria tetrantha* DANSER, in Bull. Jard. Bot. Buitenzorg, sér. 3, X, 3 (1929) 322; *Lepidella tetrantha* DANSER, in Blumea, II, 2 (1936) 37.

23. Additions to the Loranthaceae of New Guinea.

I, 1. **Amylotheca dictyophleba** (F. v. MUELLER) VAN TIEGHEM — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 242.

Papua, Middle Fly River, Lake Daviumbu, VIII 1936, BRASS 7587 (L, double from AA), occasional on lake-shore trees, upper part of perianth-tube yellow, other parts red, covered with glaucous bloom. Second record for New Guinea.

I, 2. **Amylotheca triflora** (SPANOGHE) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 250; Blumea, III, 38.

Waigeo, Samlam, 300 m alt., 31 V 1931, G. STEIN 178 (BD); Sattelberg bis Junzaing, 800—1500 m alt., I 1929, E. MAYR 741 (BD).

I. 3. **Amylotheca Versteegii** (LAUTERBACH) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 251; Blumea, III, 39.

Papua, Western Division, Daru Island, 2 IV 1936, BRASS 6429 (L, double from AA), uncommon parasitic shrub on rain-forest trees, base of perianth-tube red, upper part and lobes green; Middle Fly River, Lake Daviumbu, VIII 1936, BRASS 7597 (L, double from AA), common on lake-shore trees, perianth red and green; Lower Fly River, east bank opposite Sturt Island, rain forest, X 1936, Brass 8199 (L, double from AA), common on low trees along river, lower perianth tube red, upper green, lobes greenish white; Morobe, Sattelberg, Sambanga, 5—6,000 ft el., forest mountain on big cordate leaf tree, 13 XI 1937, Clemens 7586 (BD).

II, 1. **Amyema barbellata** (Blakely) Danser — Cfr. Blumea, III, 42.

N.E. New Guinea, Morobe, Yunzaing, 4500 ft alt., 25 VI 1937, Clemens 6447 (BD), on *Melia*, flowers light yellow apex, base salmon pink red; *ibidem*, 18 VI 1937, Clemens 6447a (BD), flowers yellow, base red; Sattelberg, Sambanga, 5—6,000 ft alt., 3 XII 1937, Clemens 7835 (BD), flower buds pale, faint brown tinge, like fruit; Boana, mountain bush on *Albizzia*, near mission, 3300 ft alt., 9 VI 1938, Clemens 8241 (BD), flower yellow-orange; Abe, Sarawaket, mountain bush, 4—6,000 ft alt. (prob.), 15—18 VI 1938, Clemens 8312 (BD), flower base red, to yellow; mts. above Boana, 4—5,000 ft alt., 26 VII 1938, Clemens 8536 (BD), flower base salmon red, apex yellow.

In the above mentioned specimens, the style length varies from 28 to 36 mm.

II, 2. **Amyema clavipes** Danser — Cfr. Brittonia, II, 132, t. I, d; Blumea, III, 43.

New Guinea, Morobe, Mt. Sarawaket, Bog Meadow Camp, but up to forest limits, 4 & 17 III 1937, Clemens 5607 (BD), bright red.

This specimen is somewhat more robust than the type, the leaf-bearing twigs are up to 5 mm in diam., the internodes to 7 cm long, the leaves more oblong or narrow-oblong, the laminae to 7 cm long by 2.5 cm broad, the inflorescences in the axils of the older leaves 2 or 3 together, the flowers somewhat coarser, the styles 25—26 mm long.

II, 3. **Amyema corniculata** Danser — Cfr. Brittonia, II, 133, t. I, e—g; Blumea, III, 44.

N.E. New Guinea, Morobe District, Mt. Sarawaket, 11,000 ft (?) alt., on little tree near rock wall, 6 X 1937, Clemens 7403 (BD), flower bright purple red; *ibidem*, X 1937, Clemens s.n. (BD), without original label, perhaps belonging to the former collection.

The specimens above mentioned certainly represent the same species and probably belong to *A. corniculata*. As, however, they are somewhat different from the type specimens, I give the following description based on them.

Entirely glabrous. Twigs terete, internodes usually 1—3 cm long, the leaf-bearing ones terete and 1—1.5 mm in diam. at the base, dilated to 2 mm towards the apex, the older ones terete, finally with tuberculate-thickened leaf-insertions and axils, their surface rough by wrinkles, crevices and lenticels. Leaves opposite; petioles hardly thickened at the base, terete, but flattened above or even slightly canaliculate towards the lamina, 3—6 mm long, nearly 1 mm broad; laminae elliptic to oblong or obovate to obovate-oblong, usually 2—4 cm long, 8—20 mm broad, rounded to obtuse at the apex, cuneate or somewhat rounded at the base and rather abruptly contracted into the petiole, thickish, dull on both sides, nearly nerveless, only the midrib visible above and in the basal part below. Inflorescences in the axils of the older leaves and on the leafless nodes, single, 4-rayed umbels of triads of which the middle flowers sessile, the lateral ones pedicelled; peduncles of the inflorescences in bud 1—2 cm long, nearly 1 mm thick, slightly clavate at the base, slightly capitate at the apex, those of the fruit-bearing ones as long and somewhat thicker; all ramifications divaricate; rays to 6 mm long in the inflorescences in bud, up to 9 mm long in the fruit-bearing ones, nearly 0.6 mm in diam. at the base; pedicels of the lateral flowers nearly 5 mm long when fruit-bearing; bracts triangular-ovate, nearly 0.5 mm long, somewhat convex, always with a tubercle on their back that often is half as long as the bract, usually smaller, here and there moreover with indistinct smaller tubercles and sometimes with a single small tooth at the margin. Fruits roundish-ellipsoid, to 4 by 3 mm, crowned by the nearly flat disc nearly 1 mm in diameter and surrounded by the very short calyx limb.

The differences from the type that are of some importance are the thicker inflorescences, the much longer rays and pedicels, and the less developed tubercles on the bracts.

II, 4. **Amyema finisterrae** (WARBURG) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 332; Blumea, III, 44.

N.E. New Guinea, Morobe Distr., Sattelberg, Sambanga, 5—6,000 ft alt., mossy forest near rivulet, 20 VIII 1937, CLEMENS 6760 (BD), red lorant, on big *Turpinia*; *ibidem*, on great *Podocarpus*, 1 X 1937, CLEMENS 7240 (BD), flower red; *ibidem*, on big Euph. tree, 13 XI 1937, CLEMENS s. n. (BD), "supplement", probably to the preceding, with which it is nearly identical, numbered 7573a in Berlin; moreover a specimen without label, XII 1937, numbered 7754a in Berlin.

The first mentioned specimens are different from all former ones by narrower leaves and longer flowers. The corollas in bud are up to 38 mm long, two styles are 40 and 41 mm long. The bracts are distinctly cupulate-amplexicaulous, and opposite the bract the margin often bears 2 short, acute teeth, as if two bracteoles were connate with the bract. One flower bears two opposite bracts, and between these we find, on each side, two such teeth somewhat connate (as in interpetiolary stipules); such teeth we also find in the other specimens mentioned above, and the "supplement" again bears 2 bracts to one of the flowers.

II, 5. **Amyema friesiana** (K. SCHUMANN) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 332; Blumea, III, 46.

N.E. New Guinea, Morobe District, Mt. Sarawaket, forest limits, 12,500 ft (?), 7 IV 1937, CLEMENS 5776 (BD); Yunzaing, 4500 ft alt., 18 VI 1937, CLEMENS 6499 (BD), on *Calophyllum*, fruit brown; Sattelberg, Sambanga, high forest, mountain above "village" on big *Rutacea*, 5—6,000 ft alt., 27 XI 1937, CLEMENS 7754 (BD), flower red, yellow apex; Saruwaged Gebirge, Ogeramnang, 1800 m alt., III 1929, E. MAYR 829 (BD).

II, 6. **Amyema pentactis** DANSER, n. sp. — Plate XIII, left part.

Robusta, omnis glabra. Internodia iuniora teretia, ad 5 cm longa, plerumque breviora, 2—4 mm diametro, apicem versus ad sesquiplo dilatata, levia, cinerea vel subfusca, vetustiora crassiora, cinerea, nodis incrassata, superficie minus levia. Folia opposita vel subopposita vel passim sparsa; petioli 2—15 mm longi, basi vix incrassati, teretes, laminam versus supra applanati; laminae ellipticae vel oblongae vel magis obovatae, ad 9 cm longae, 5 cm latae, sub basi cuneata in petiolum contractae, apice obtusae vel rotundatae, crassiusculae, fragiles, utrinque leves sed minime lucentes, e fusco rufidulae, facie superiore nervis vix visibilibus, inferiore costa et nervis maioribus latis et planis distinctis. Inflorescentiae gregatim in nodis defoliatis, umbellae pedunculatae triadum floribus omnibus sessilibus; pedunculi plerumque 15—25 mm longi, basi clavati, ceterum teretes, 0.6—0.8 mm diametro, apice in receptaculum subglobosum circiter 1.5 mm crassum incrassati; radii plerumque 5, teretes, 4—5 mm longi, circiter 0.5 mm diametro, basi nonnihil clavati; bracteae triadum aequales, basi nonnihil connatae, ovato-triangulares, primum calycibus appressae, denique patentes. Calyces obovati, circiter 2.5 mm longi, 1.5—2 mm diametro, iam in alabastris aucti, cinerei vel albidi, minime lucentes, limbo brevissimo inflexo. Corollae in alabastris adultis basi leviter dilatatae, dimidia parte inferiore teretes, 0.3—0.4 mm latae, dimidia parte superiore gradatim nonnihil dilatatae, deinde abrupte in clavam obovatam cricter 1.5 mm longam vix 1 mm latam incrassatae, postea divisae in petala 6 basi nonnihil dilatata ad 0.25 mm lata, deinde gradatim ad dimidiam latitudinem angustata, denique in partem apicalem anguste spathuliformem incrassatam acutam dilatata, circiter 6 mm sub apice recurvata. Filamenta filiformia; antherae oblongae vel obovato-oblongae, circ. 1.25 mm longae, distincte 4-loculares. Stylus corollae aequilongus vel paulo longior, 14—18 mm longus, subfiliformis, angulatus, parte apicali tereti excepto; stigma stylo paulo tantum longior, rotundatum vel subtruncatum. Fructus ignotus.

In general appearance this species reminds one of *A. ovariosa,* but differs from this as well as from the closely allied *A. scandens*, by non-verticillate leaves and shorter flowers. By its opposite leaves it resembles *A. friesiana, A. cercidioides, A. triantha,* and *A. obovata,* but differs from all these by different leaf-shape, from most of them by shorter flowers. The strongest resemblance is with *A. triantha,* from Borneo, which likewise has short flowers, but it differs from this by glabrous inflorescences, narrower leaves, more triangular-ovate bracts, and calyces not constricted below the limb.

N.E. New Guinea, Morobe District, Mt. Sarawaket, Abe, open bush, 5—6,000 ft alt. (probably), 15—18 VI 1938, CLEMENS 8307a (BD), flower purplish red. *Type* of the species.

II, 7. **Amyema scandens** (VAN TIEGHEM) DANSER = *Amyema verticillifolia* (K. KRAUSE) DANSER; cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 354; XVI, 92; Blumea, III, 48.

New Guinea, Papua, Western Division, Penzara, between Morehead and Wassi Kussa Rivers, savannah forests, XII 1936, BRASS 8435 (L, double from AA), scandent, flowers pink; N.E. New Guinea, Morobe District, Sambanga, on mountain forest tree, 5—6,000 ft alt., 25 VIII 1937, CLEMENS 6836 (BD), shrub, buds all pink.

I see no differences between these specimens and *Amyema scandens* from New Caledonia and Lifu. Though Mrs. CLEMENS's specimen is described as a shrub, and not as scandent, the materials available consist of three fragments of a runner bearing inflorescences. The corollas of this specimen are not yet open, and are already 36 mm long; such long corollas were hitherto unknown in the New Guinea *Amyema verticillifolia,* but are common in the New Caledonian *Amyema scandens.* Because of the swollen calyces this specimen ought to be included into *A. ovariosa* DANSER, but I think it will be impossible to maintain this species.

II, 8. **Amyema seemeniana** (K. SCHUMANN) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 345; Blumea, III, 47.

New Guinea, Papua, Lower Fly River, east bank opposite Sturt Island, X 1936, BRASS 7990 (L, double from AA), common, parasitic on high trees in rain forest, perianth yellow-green, anthers red.

Differs from the type of *A. seemeniana* by all parts being glabrous and by the very short calyx limbs; by the former character it comes nearer to *A. articulata*; moreover the leaves are usually oblong. The flowers are distinctly 5-merous.

III, 1. **Dicymanthes tetrapetala** Danser, n. sp. — Fig. 1, d (p. 390).

Ramuli teretes, 3.5—6 mm diametro, nodis nonnihil incrassatis, internodiis ad 13 cm longis, fere levibus. Folia opposita, subsessilia, lamina ovata, ad 14 cm longa, 7 cm lata, apicem obtusiusculum versus acuta, sub basi rotundata subito contracta, crassiuscula, fragili, utrinque opaca, faciebus distincte diversis, superiore cano-viridi, inferiore magis rufa, penninervi, costa nervisque lateralibus utrinque distinctis sed subtus magis prominentibus quam supra, venis omnino invisibilibus vel supra indistinctis. Inflorescentiae circum nodos foliiferos, capitula breve pedunculata floribus 6 in triadibus 2 dispositis, involucro e bracteis 2 florum mediorum bracteolisque 4 florum lateralium composito; pedunculus involucrumque tenuiter ferrugineo tomentosi; pedunculus 2 mm longus, 1—2 mm latus, apice latior quam basi; bracteae adscendentes, conduplicato-suborbiculares, obtusae, dorso rotundato, concavae, 3.5—4 mm longae; bracteolae oblongae, planae, bracteis aquilongae, fere 2 mm latae, obtusae. Calyx parce ferrugineo tomentosus, anguste campanulatus, nonnihil infundibuliformis, tubo circiter 2.5 mm longo, supra 1 mm lato, limbo 0.5—0.75 cm longo, paulum infundibuliformis, margine irregulariter dentato, pilis ferrugineis breve fimbriato. Corolla statu alabastri tantum nota, ad 30 mm longa, parce ferrugineo tomentosa, a basi ad apicem fere aequilata, basi circiter 1 mm lata, 4-angula, ad $^2/_3$ longitudinis magis teres et nonnihil angustata, deinde iterum incrassata in clavam angustam circiter 5 mm longam 1—1.25 mm crassam, acutiusculam, postea probabiliter divisa in petala 4 (in alabastris passim basi separata). Corolla aperta et fructus ignoti.

In general appearance different from all other *Dicymanthes* species known hitherto, especially by the longer and more cupuliformous involucres and the 4-merous flowers. The genus is new to New Guinea.

New Guinea, Saruwaged Mountains, Ogeramnang, 1800 m alt., 22 III 1929, E. Mayr 819 (BD). *Type* of the species.

IV, 1. **Distrianthes molliflora** (K. Krause) Danser — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 366.

N.E. New Guinea, Morobe, Kalanza, grass land, bush margin, 1500 ft alt., 2 I 1938, Clemens 7932 (BD), shrub, big plant, flower red.

Like the specimen mentioned by me in Blumea, III, 48, as *Distrianthes Lamii*, the above mentioned specimen is an intermediate between

Distrianthes Lamii and *molliflora*, but comes nearer to *D. molliflora*, because of its flowers, that are entirely densely long-hairy; the involucre, however, is nearly glabrous, only here and there with remnants of stellate hairs. The petioles are short and thick, 5—6 mm long, 5 mm in diameter, the laminae are 18—22 cm long, 9—11 cm broad, rounded at the base, very obtuse at the apex, not acuminate, rather thick-coriaceous; also in these respects our specimen unites *D. molliflora* with *D. Lamii*. The involucral bracts are 40—45 mm long, connate in the basal 5 mm; such long involucres were, hitherto, unknown in *Distrianthes*. Rather than base a new species on the above specimen, I should prefer to unite *D. molliflora* and *D. Lamii*. In that case the epithet "*molliflora*" would have one year's priority over "*Lamii*".

V, 1. **Dendrophthoë falcata** (LINN. FIL.) ETTINGSHAUSEN — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 403; Blumea, III, 52.

Papua, Western Division, Daru Island, parasitic on *Rhizophora mucronata*, 29 II 1936, BRASS 6234 (L, double from AA), small shrub, corolla tube yellow; *ibidem*, parasitic in mangrove forests, 11 III 1936, BRASS 6330 (L, double from AA), common, corolla lobes red, tube yellow; Middle Fly River, Lake Daviumbu, on dry *Banksia-Grevillea* savannahs, VIII 1936, BRASS 7447 (L, double from AA) plentiful, flowers orange-yellow with reflexed red lobes; *ibidem*, on low *Banksias* of savannahs, IX 1936, BRASS 7930 (L, double from AA), plentiful, conspicuous when displaying young red leaves, flowers orange-red.

V, 2. **Dendrophthoë Gjellerupii** (LAUTERBACH) DANSER — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 409; Blumea, III, 52.

New Guinea, Papua, Western District, Wassi-Kussa River, Tumbuke, on low trees in *Agonis* and *Melaleuca* savannah forests, XII 1936, BRASS 8476 (L, double from AA), plant rusty-brown, flowers reddish-brown, inner surface of perianth-lobes pink; *ibidem*, Tarara, in savannah forests, I 1937, BRASS 8667 (L, double from AA), inner surface of perianth lobes pink; Morobe, Boana, below mission, 3000 ft alt., 6 VI 1938, CLEMENS 8235 (BD).

VI, 1. **Notothixos leiophyllus** K. SCHUMANN — Cfr. Bull. Jard. Bot. Buitenzorg, sér. 3, XI, 456; Blumea, III, 55.

New Guinea, Papua, Fly River, 528 mile camp, V 1936, BRASS 6818 (L, double from AA), parasitic on branches of tall canopy tree, young leaves and inflorescence golden yellow; Morobe, Sattelberg, 3000 ft alt., on *Pygeum*, forest hill below mission, 24 III 1938, CLEMENS 8067 (BD), flowers vivid yellow, fruit gray-greenish.

VII, 1. **Viscum ovalifolium** A. P. DE CANDOLLE — Cfr. Blumea, III, 58.

New Guinea, Papua, Palmer River, 2 mi. below junction Black River, 100 m alt., VII 1936, BRASS 7211 (L, double from AA) parasitic on forest canopy liana, much branched weak shrub, flowers green, minute, fruit orange-brown, warty, ± 6 mm diam.

Index to collectors' numbers mentioned in this note.

BRASS 6234, 6330 = V, 1; 6429 = I, 3; 6818 = VI, 1; 7211 = VII, 1; 7447 = V, 1; 7587 = I, 1; 7597 = I, 3; 7930 = V, I; 7990 = II, 8; 8199 = I, 3; 8435 = II, 7; 8476, 8667 = V, 2.

CLEMENS s.n. = II, 3 & II, 4; 5607 = II, 2; 5776 = II, 5; 6447, 6447a = II, 1; 6499 = II, 5; 6760 = II, 4; 6836 = II, 7; 7240 = II, 4; 7403 = II, 3; 7573a = II, 4; 7586 = I, 3; 7754 = II, 5; 7754a = II, 4; 7835 = II, 1; 7932 = IV, 1; 8067 = VI, 1; 8235 = V, 2; 8241 = II, 1; 8307a = II, 6; 8312, 8536 = II, 1.

MAYR 741 = I, 2; 819 = III, 1; 829 = II, 5.

STEIN 178 = I, 2.

24. Two new species of Taxillus.

Taxillus assamicus DANSER, n. sp. — Plate XIV.

Partes novissimae tomento tenui ferrugineo, in organis vegetativis mox deciduo, in inflorescentiis floribusque partim persistente, in corolla et fructu tenuescente denique nullo. Ramuli graciliores, teretes, internodiis ad 3 cm longis plerumque multo brevioribus, iam inter folia adulta cortice cinereo lenticellis numerosis, 1—3 mm diametro, nodis sesquiplo vel duplo latioribus. Folia opposita vel subopposita; petiolus difficile a lamina distinguendus, 2—6 mm longus, e basi subtereti laminam versus supra applanatus; lamina ovato-oblonga vel ovato-lanceolata, 4—12 cm longa, 1—5 cm lata, basi in petiolum attenuata, apicem obtusum versus acuta vel nonnihil acuminata, tenuiter coriacea, faciebus paulum tantum diversis, haud lucidis, coloribus plerumque pallidioribus, facie superiore nervatura omni usque ad venas visibili sed paulum prominente, facie inferiore costa valde, nervis crassioribus paulum prominentibus, venis plerumque invisibilibus. Inflorescentiae singulae in axillus foliorum et paucae in nodis defoliatis, umbellae sessiles vel subsessiles floribus 4 vel paucioribus; pedunculus 0—0.5 mm longus; pedicelli teretes, plerumque 2—5 mm longi, apice nonnihil capitati; bracteae suborbiculares, obtusissimae, convexae, semiamplexicaules, 0.5—1 mm longae. Calyx campanulato-obovatus, 1.25—1.5 mm longus, 1 mm latus, limbo brevissimo erecto vel inflexo; corolla statu alabastri adulti stylo aequilonga, e parte basali cylindrica medio inflata, plerumque ad 2 mm lata, deinde in collum 1 mm latum attenuata, denique in clavam angustam, circiter 1.5 mm crassam, obtusam incrassata, postea decurvata et divisa in lacinias 4 more Scurrularum; stylus 20—30 mm longus, filiformis, stigmate multo crassiore, globoso, 0.3—0.4 mm diametro. Fructus obovatus, ad 6 mm longus, 4 mm diametro, apice subtruncatus, limbo nullo, disco convexo, superficie granulata vel verruculosa. (Description mainly from DEKA s.n., in flower, and DEKA 16588, in fruit, in the Shillong Herbarium.)

Loranthus umbellifer, in HOOKER's Flora of British India, V, p. 211, appears to be a mixture of different species, among which the one here described as new. His var. *clavigera* appears to be a well-distinct species, which I call *Scurrula Corynitis* (SPRENGEL) G. DON. The main form of the species is, according to its name, SCHULTES's *Loranthus umbellifer*, a plant with the flowers in peduncled, 3—4-flowered umbels, and which I call *Taxillus umbellifer* (SCHULTES) DANSER. The only number, however, which HOOKER cites, as "Loranth. 72, Herb. Ind. Or. H. f. & T.", is the species here described as new. It appears to be common in Assam, and is easily distinguished by its sessile umbels. Moreover HOOKER labelled specimens as *Loranthus umbellatus* WALL. or *umbellifer* SCHULT., which have flowers in prolongate racemes, and which I prefer to include in *Scurrula elata* (EDGEWORTH) DANSER.

Assam. Khasia, 4—6000 ft alt., J. D. HOOKER "*Loranthus* 72" (BD, L); Khasi Hills, Bendon Falls, 4500 ft alt., U. KANJILAL 2415 (Sh); Khasi Hills, Rangumtia, 5500 ft alt., U. KANJILAL 2642 (Sh); Khasi & Jyntea Hills, Mairang, 5500 ft alt., H. KANJILAL 5864 (DD); K. & J. Hills, Peak Forest, S. R. SHARMA 9749 (Sh); *ibidem*, G. K. DEKA 16588 (Sh); Lawlyngdoh, G. K. DEKA s.n. (Sh), **type** of the species.

Taxillus rutilus DANSER, n. sp. — Plate XV, right part.

Indumentum foliorum et ramulorum iuvenilium densum, flavidofuscum, in foliorum facie superiore mox deciduum, in ramulis tenuescens sed tamdiu persistens quam folia, in foliorum facie inferiore paululum tenuescens et obscurescens, sed semper densum, in inflorescentiis et calycibus semper densum, magis rutilum quam in partibus vegetativis, in corollis etiam fere rubrum et magis floccosum quam in calycibus, tempore florendi tamen tenuescens. Ramuli teretes, internodiis iuvenilibus ad nodos applanatis et dilatatis, vetustioribus magis teretibus, folia adulta ferentibus ad 5 cm longis, 2—3 mm diametro, post lapsum indumenti cinereis, mox lenticellis numerosis. Folia opposita vel subopposita; petiolus plerumque 6—10 mm longus, teres, laminam versus supra applanatus; lamina oblonga, rarius elliptica, plerumque 4—7 cm longa, 1.5—2.5 cm lata, apice basique acuta vel obtusiuscula, chartacea, facie superiore flavo-fusca, semi-lucida, nervatura omni usque ad venas visibili sed indistincta, facie inferiore indumento vestita sed costa valde prominente. Inflorescentiae paucae in axillis foliorum vetustiorum et numerosae in nodis defoliatis, umbellae pedunculatae floribus plerumque 2 vel 1, raro 3; pedunculus 3—5 mm, plerumque 4 mm longus, teres, apice basique vix incrassatus, minus quam 0.5 mm (plerumque 0.3—0.4 mm) crassus, inter flores 2 in apiculum parvum obtusum prolongatus; pedicelli tenuiores, 1—1.5 mm longi, teretes; bractea ovata obtusa parva convexa, circiter 0.5 mm longa. Calyx obovatus, 1.5—2 mm longus, limbo indistincto, brevi et inflexo; corolla statu alabastri adulti circiter 22 mm longa, in partibus ¾ inferioribus ad 4 mm diametro inflata, deinde in collum breve 1.5 mm latum attenuata, denique in clavam breve obovatam 3 mm longam 2.5 mm latam inflata, postea usque ad partem angustissimam divisa in lacinias 4, fissura singula profundiore, parte reflexa spathulata, ut corollae tubus crassiuscula, circiter 5 mm longa 1 mm lata, uncinata, acutiuscula, facie interiore cava viridi; filamenta atra, c. 3 mm longa; antherae c. 1 mm longae obtusae, loculis 4 haud transverse septatis; stylus plerumque c. 22 mm longus, a basi ad apicem gradatim attenuatus, maxima parte acute quadriangulus, parte superiore 3 mm longa teres, stigmate styli basi subaequicrasso, styli apice circiter sesquiplo crassiore, obtuso. Fructus semievoluti obovati, maturi ignoti. (Description from the type Sin 3905.)

This species is closely allied to the western *T. vestitus,* the northern *T. sutchuenensis* and *T. tibethensis,* the eastern *T. yadoriki,* and the southern *T. kwantungensis.* The greatest resemblance is with *T. vestitus,* especially in the shape and indument of the twigs and leaves, and the usually 2-flowered umbels, but it differs from this species and approaches the other species by longer flowers, pedicels and peduncles. The reddish colour of the inflorescences and flowers, especially of the corollas, is remarkable, and causes a resemblance to *T. yadoriki,* but in this species not only the flowers and inflorescences, but also the indument of the twigs and the leaves is dark reddish-brown, and the leaves are more roundish and of a darker colour. It is not at all impossible that all the species mentioned are geographical variations of one polymorphous species, but their distribution is inadequately known up till now.

China, Kwangsi Prov., Yao Shan, alt. 800 m, S. S. Sin 3905 (Hb. Sun Yatsen Univ., doubles in BD and L), **type**; *ibidem,* alt. 600 m, S. S. Sin 3990 (Hb. Sun Yatsen Univ., BD), entirely identical with the former; probably also: China, South Hunan, S. S. Sin 672 (BD),

and Hunan Prov., Chao Shan, Siangtau, alt. 300 ft, S. S. SIN S. H. 216 (BD).

SIN 672 has not yet adult flower buds, SIN S. H. 216 has only very young flower buds, and both are, therefore, not quite certain.

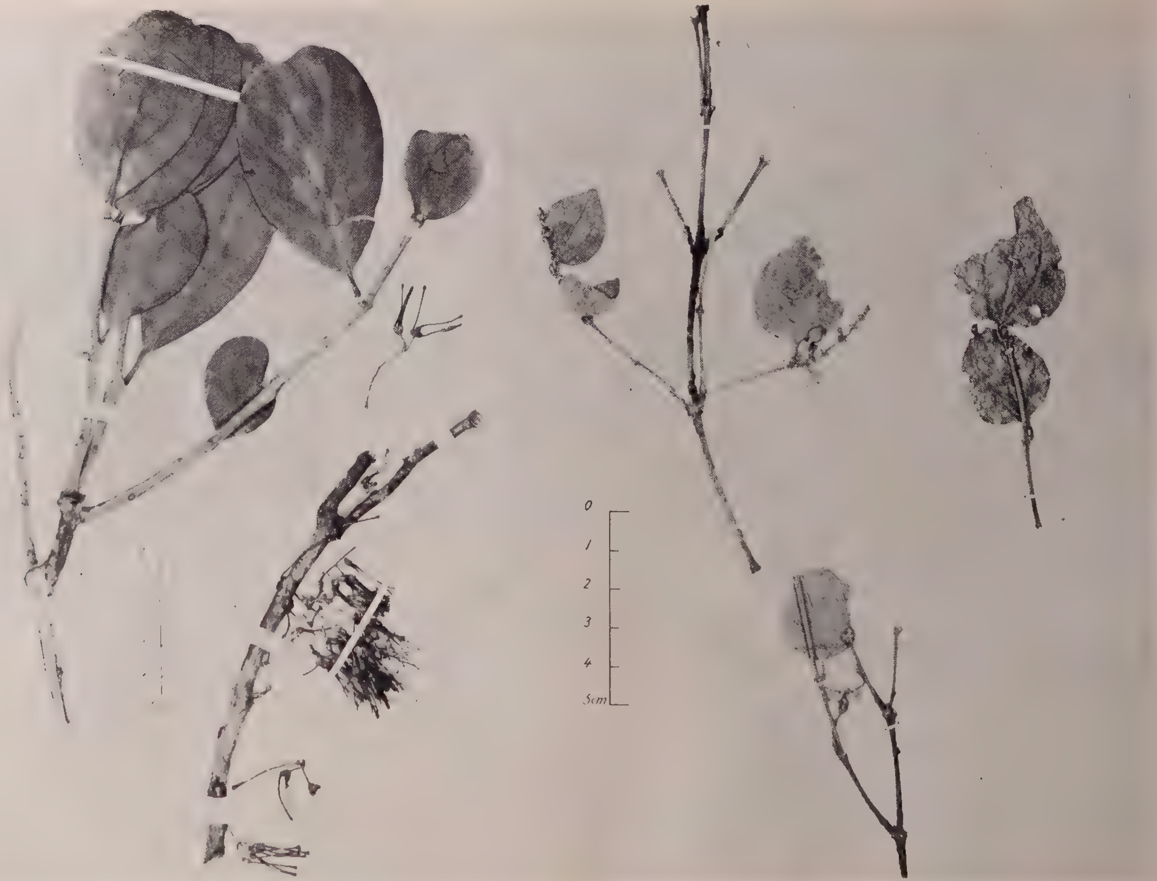

Plate XIII. To the left: *Amyema pentactis* Danser, part of the type (Cemens 8307a); to the right: *Notothixos merguiensis* Danser, part of the type (Braybon's collector 201). — Photo L. Alkema.

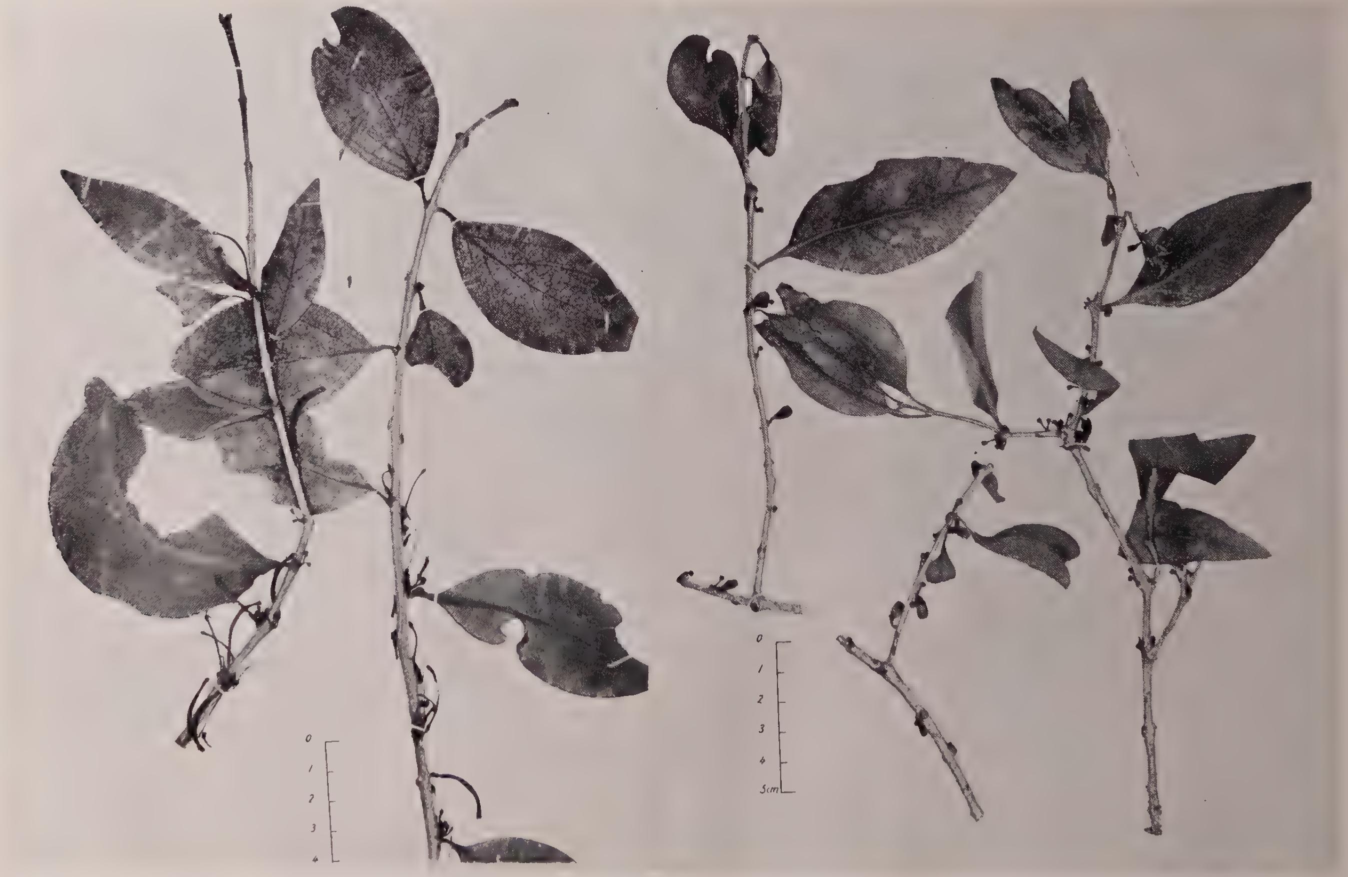

Plate XIV. *Taxillus assamicus* DANSER; to the left: first type, in flower (DEKA s.n.), to the right: second type, in fruit (DEKA 16588). — Photo L. ALKEMA.

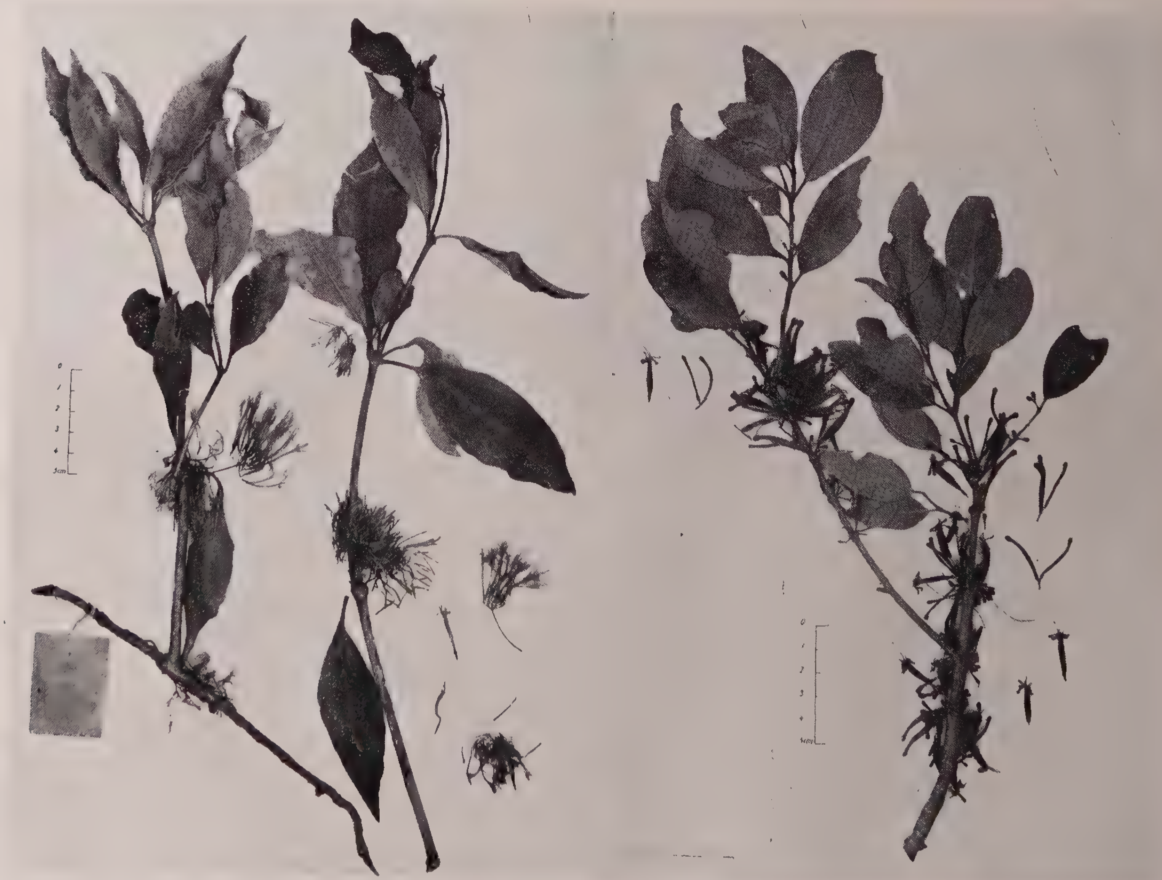

Plate XV. To the left: *Amyema polytrias* DANSER, type specimen (GREVENSTUK 212); to the right: *Taxillus rutilus* DANSER, type (SIN 3905). — Photo L. ALKEMA.

SOME GALLS FROM THE ISLAND OF ENGGANO

by

W. M. DOCTERS VAN LEEUWEN.
(Leersum — Holland).

The island of Enggano is the most southern of a series of islands situated parallel to the Western coast of Sumatra. In 1936 the island was visited by Dr. W. J. LÜTJEHARMS, who stayed there from the end of May to the beginning of July collecting materials for the Herbaria at Buitenzorg and Leiden. During this excursion he also collected some zoocecidia, which were sent to me for classification by the Director of the Rijksherbarium, Leiden.

The collection consists of 16 galls on various plants; many of them were already known as occurring in other parts of the Malay Archipelago; others are new, these are marked with an asterisk. A collection of 16 galls is actually to small to give insight into the wealth of galls of this tropical island; so far, however, nothing was known about the galls of the island, and since it is unlikely that the place will before long again be examined as to its galls, I deemed it worthwile to describe this small collection.

Most of the galls have been described by Mrs. DOCTERS VAN LEEUWEN and myself in a book on the galls of the Netherlands' Indies (J. DOCTERS VAN LEEUWEN—REIJNVAAN and W. M. DOCTERS VAN LEEUWEN, The Zoocecidia of the Netherlands East Indies, Batavia, 1926). Litterature on the subject can be found in this book. For briefness' sake I only mention the page on which a gall is described in our book, in case it was already known at that time, and the number. The book is referred to as: D. v. L.—R., 1926.

Eleven of the galls are caused by gall-midges, 3 by mites, one by a lepidopteron, and one by a thrips. From this we may conclude that the galls were mainly found in rain-forest or densely wooded or shaded areas, because in dry regions the gallmite-galls play a more prominent part. But it is dangerous to draw conclusions from so small a collection.

Descriptions of the galls.

Ficus Benjamina L.

1. A leaf-gall caused by a gall-midge, D. v. L.—R., 1926, p. 120, no. 211.

The gall is an excrescence on the underside of the leaf-blade; glossy and semi-globular, affixed to the leaf by a broad base and about 5 mm across. On the upperside there is only a flat discoloration, which is very hard. Inside there is a rounded larval chamber surrounded by a hard wall. The galls are mostly situated near the main-nerve and near the base of the leaf-blade. This gall is known as occurring in Java.

Forest near Boea-Boea, 9-VI-1936, Lütjeharms nr. 4456A.

Flacourtia ? Rukam Z. & M.

2. A leaf-gall caused by a gall-midge, D. v. L.—R., 1926, p. 395, no. 1017.

Very flat, discoid galls are strewn over the leaf-blade. They are circular or elongated, 4—5 mm across, and about ½ mm thick. Both on the upperside and on the underside there exists in the centre of this disc a tiny, very short conical pinnacle, often hardly developed. In the materials from Java the upper pinnacle is covered with very short hairlets; these hairs are absent on the galls from the island of Enggano. In the centre is a tiny larval chamber surrounded by hard tissues. This gall is known as occurring in Java.

Malakoni, 21-VI-1936, Lütjeharms nr. 4935A.

Garcinia species.

3*. A leaf-gall caused by a gall-mite.

A peculiar gall, of a kind that I have never met before. The under surface of the leaf is strewn with minute knobs, not $^1/_5$ mm high and broad. They are situated in wavy, double rows as if the animal, the gall-causer, has walked over the leaf, and punctured it at regular distances; the rows run in all directions and often intersect. Where the rows are very close together the galls coalesce and form a very low and flat elevation of the leaf-blade, otherwise the excrescences are apart. Each knob has a tiny opening at its top which gives access to a small hole, the gall-chamber. Though more rarely, the rows of the galls also occur on the upper surface of the leaf.

Meok, Roadside in coconut plantation, 7-VII-1936, Lütjeharms nr. 5433A.

Heritiera littoralis Dryand.

4. A leaf-gall caused by a gall-midge, D. v. L.—R., 1926, p. 376, no. 958.

The under surface of the leaf is strewn with brown galls, often close together, near and on the mid-rib. They are semi-globular, a little broader than high, 3 to 2 mm, attached to the leaf by a broad base. The surface of the gall is covered with a brown, corky layer which in the mature galls is irregularly broken. The midges leave the gall through a circular opening in the top. At the upperside of the leaf there is only an inconspicuous swelling. Sometimes the gall proper is situated on the upper surface of the leaf. This gall is known as occurring in Java.

Teloek-Kiowa, behind the tidal-forest, 1-VII-1936, LÜTJEHARMS nr. 5206A.

Ilex cymosa BL.

5. A leaf-gall caused by a gall-midge, D. v. L.—R., 1926, p. 327, no. 810.

This gall is almost identical with the one described from Java, Sumatra, and Borneo, it is only a little broader. The galls are situated on the upperside of the leaf-blade, as rounded excrescences, 3 to 5 mm high and 3 to 4 mm across, with a glossy surface. On the underside there exists only a circular depression, 2 mm across and with a yellowish-brown, glossy surface. In the centre of this depression is a tiny, cylindrical excrescence. The wall of the gall-chamber is thick and woody (*Fig. 1*).

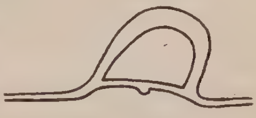

Fig. 1. *Ilex cymosa* BL., × 7½.

Teloek-Kiowa, strand-forest, 1-VII-1936, LÜTJEHARMS nr. 5198A.

Mangifera species.

6*. A leaf-gall caused by a gall-midge.

Globular galls affixed to the underside of the leaf-blade. They are 2 mm across and attached to the leaf by a broad base. On the upper surface there exists only a tiny, flat, discoloured swelling. The surface of the gall is covered with straight, brown hairs which give the gall a fluffy aspect. The length of the gall-chamber is twice its width and the globular shape is formed by the outstanding hairs. The wall itself is very thin, surrounding a spacious larval-chamber (*Fig. 2*).

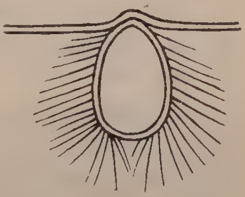

Fig. 2. *Mangifera* species. × 15.

Between these galls there are a great many flat, hairy cushions, about 1 mm across. Inside there is no gall-chamber and the hairs are identical with the hairs attached to the surface of the galls, described above. These cushions are galls which, by some cause or other, have not developed normally, the inhabitants having died.

Koho Ahepea, alt. 200 m, forest, 12-VI-1936, LÜTJEHARMS nr. 4611A.

7*. A gall on the main-nerve and on the twigs caused by a gall-midge.

On the under-surface of the leaf part of the main-nerve is abruptly swollen into an oval or almost globular gall, 5 to 6 mm long, and 4 to 5 mm broad and high. The surface is covered with a corky layer. Inside there is a rounded larval chamber surrounded by a thick, hard wall. On the upperside of the leaf only a slight longitudinal swelling of the mid-rib is to be seen. The same galls occur also on the young twigs, they are lobsidedly developed swellings, up to 10 mm long and up to 8 mm broad and high.

Koho Ahepea, alt. 200 m, forest, 12-VI-1936, LÜTJEHARMS nr. 4611B.

Melothria ? mucronata (BRIQ.) COGN.

8. A stem-gal caused by a gall-midge, D. v. L.—R., 1926, p. 550, no. 1495.

The gall is the same as the one developed on *Melothria perpusilla* COGN. and caused by *Prolasioptera javanica* KIEFF et D. v. L.—R. Fusiform swellings of the stem, especially at the nodes, and up to 30 mm long and 5 mm across. The surface is covered by a corky layer, and inside there is a juicy parenchym in which elongated larval chambers are enclosed. Sometimes the end of the stem is changed into the gall and the growing-point is involved in the formation of the gall. This gall is also known as occurring in Java.

Meok, forest, 25-V-1936, LÜTJEHARMS nr. 3756A.

Pericampylus glaucus MERR.

9. A leaf-gall caused by a gall-midge, D. v. L.—R., 1926, p. 180, no. 386.

A widely distributed gall on this common plant. On the upper surface of the leaf the gall is semi-globular, contracted at its base and 1 to 3 mm across. The surface is covered with white hairs. On the underside of the leaf there is a conical or more or less globular excrescence, densily covered with white hairs. A spacious, circular opening is found in the underside of the gall when the gall-midge hatches. This gall is collected in Java, Krakatau Island, Sebesi Island, Sumatra, and the Island of Wé.

Meok, border of forest between shrubs, 27-V-1936, LÜTJEHARMS nr. 3838A.

Petunga microcarpa BL.

10. A stem-top-gall caused by a lepidopteron, D. v. L.—R., 1926, p. 532, no. 1434.

The stem-top is changed into a fusiform swelling, about 10 mm long and 8 mm across. Inside there is a spacious chamber tenanted by a caterpillar. The wall of the gall is hard. The gall consists out of many shortened internodes and the leaves on the gall are close together and much smaller than the normal leaves. At the base of the gall they are about 8 mm long and 6 mm broad, getting gradually smaller towards the top. The top leaves are very small, sometimes only the mid-rib is left, and sometimes there are leaves which have the form of small cups. The leaves form a kind of leaf-rozette. This gall is known as occurring in Java and Salajar Island.

Malakoni-Meok, forest, 19-VI-1936, LÜTJEHARMS nr. 4838A.

Pongamia pinnata MERR.

11. A leaf-gall caused by a gall-mite, D. v. L.—R., 1926, p. 248, no. 585.

These galls are only developed on one side of the leaf, mostly on the upperside, on the other side there is only a small opening giving access to the gall-chamber. The galls are horn-like or club-shaped, irregular outgrowths, very variable in form, from 5 to 20 mm long and about 1 mm at the base. The innerside of the gall is covered with hairs; these consist out of a base of 4 flat cells and a long apical cell. A common beach-gall, which is known as occurring in Java, Salajar Island, and Soela Islands.

Poeloe Merbau, beach, 30-VI-1936, LÜTJEHARMS nr. 5163A.

Schefflera species.

12. A leaf-gall caused by a thrips, D. v. L.—R., 1926, p. 431, n. 1135.

This gall is identical with the gall caused by *Gynaikothrips heptapleuri* KARNY on the leaves of *Schefflera elliptica* HARMS. On the upper surface of the leaf are developed cylindrical galls, 15 to 25 mm long and 1½ to 2½ mm across, mostly curved and tapering into a sharp point. The wall is succulent and encloses a long, narrow larval chamber. On the under surface there is only a small, circular opening giving access to the gall-chamber. This gall is common on some species of *Schefflera,* it is known as occurring in Java, Sumatra, Salajar Island, Soemba, and the Philippine Islands.

Boea-Boea, alt. 100 m, forest, 5-VI-1936, LÜTJEHARMS nr. 4251A.

Symplocos odoratissima CHOISY.

13*. A leaf-gall probably caused by a gall-mite.

On the upper surface of the leaf tiny excrescences, $^1/_5$ mm across or less. The excrescences are irregular and look like granular accumulations. The material available was too scanty and the preservation too bad to render a thorough examination possible. Gall-mites were not found, but the gall can hardly be caused by any other gall-causing animal.

Near Boea-Boea, alt. 100 m, forest, 7-VI-1936, LÜTJEHARMS nr. 4355A.

Terminalia Catappa L.

14*. A leaf-gall caused by a gall-midge.

Flat, lenticular swellings developed partly on the upperside, partly on the underside of the leaf. On the upperside there is a low, circular, glossy swelling, about 2 mm across, on the underside the excrescence is also circular and very flat, in the centre is a tuft of short, greyish hairlets. Inside there is a tiny larval chamber. The midges leave the gall through an opening on the underside.

Malakoni-Meok, along the beach, 20-VI-1936, LÜTJEHARMS nr. 4840A.

Xanthophyllum ? affine KORTH.

15. A leaf-gall probably caused by a gall-midge, D. v. L.—R., 1926, p. 273, no. 662.

Bean-like excrescences on the upperside of the leaf, about 5 to 7 mm long, 3 to 5 mm broad, and 4 to 5 mm high. The surface is glossy and in the dried material of a yellowish-brown colour. On the underside there is only a curved, flat depression. Inside there is a longitudinal larval chamber. The gall is known as occurring in Java, but the galls of the island of Enggano are shorter and broader.

Boea-Boea, alt. 100 m, forest, 2-VI-1936, LÜTJEHARMS nr. 4068A.

16*. A leaf-gall caused by a gall-midge.

This gall is a flat swelling developed on both sides of the leaf-blade, and almost identical on both sides, about 3 to 4 mm across and 2 to 3 mm high. The gall is affixed to the leaf-blade by a thin, very short central part and on either side of the leaf grown out like a small rivet. Inside there is a small larval chamber extending in both parts of the gall (*Fig. 3*).

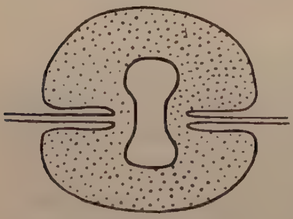

Fig. 3. *Xanthophyllum affine* KORTH., × 7½.

Boea-Boea, alt. 100 m, forest, 2-VI-1936, LÜTJEHARMS nr. 4068B.

NOTES ON THE NOMENCLATURE OF SOME GRASSES

by

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(Issued March 1st, 1940).

For the incorporation of various grasses in the herbaria of our institutes, we are constantly looking for the correct names to accept, according to the priority. The study of the existing names, as they are given in the Index Kewensis, is therefore indispensable. Working in various genera of the grasses we find, however, that many names are not tenable, because they were accepted without studying the whole literature of the subject. It appeared that various names are omitted in the Index Kewensis, and indications given in various papers are sometimes neglected.

Thus, the well-known and characteristic *Aristida rhiniochloa* HOCHST., already described in the year 1855 and treated by me in the Critical Revision (p. 510) and in my Monograph, is not yet given in the Index, although many of my new species are mentioned.

It is, of course, impossible for the compilers of the Index Kewensis to take up all the existing names without being familiar with the whole literature under a given genus. Monographical studies of the various genera ought to be prepared to make out the names we have definitively to give to a species.

I will demonstrate this with a few examples.

STEUDEL described in his well-known Synopsis in the year 1854 on pag. 53 a *Panicum comosum*. The type was collected by CUMING in the Philippines. This plant belongs to STEUDEL's section VII, which is now regarded as the distinct genus *Setaria*. STEUDEL's Synopsis was published in parts and so we find in his Addenda on p. 417 a quite different *Panicum comosum* from Japan. The type of this Japanese species is preserved in SIEBOLD's collection at Leiden and belongs to the genus *Setaria* too, although it is quite different from CUMING's plant.

Being a Japanese species it was not overlooked by Japanese botanists and Prof. KOIDZUMI placed this species in the year 1930 in the genus *Chaetochloa*, making the combination *C. comosa* (STEUD.) KOIDZ. This species was, however, earlier noted by various other botanists. FRANCHET and SAVATIER described the species as a variety *gigantea* under *Panicum viride* L.

The Japanese botanists MATSUMURA in 1886 and MAKINO in 1911 accepted this variety as a good species; without further investigations, the name *Setaria gigantea* MAKINO is the only tenable one for this species because *Setaria comosa* (STEUD.) HONDA given to our species in the year 1930 is invalid on account of STEUDEL's earlier specific epithet for a plant from the Philippines, which was taken up by MIQUEL already in the year 1855, as *Setaria comosa* (STEUD.) MIQUEL.

HONDA did not verify this, although he could have found this combination in the Index Kewensis. The question is, however, not settled and the nomenclature of this Japanese species becomes interesting, if we study STEUDEL's Synopsis more accurately. STEUDEL himself recognized that he gave the name of *Panicum comosum* twice for two different species and he recognized this fact in preparing his Index. Here we find on p. 458 his *Panicum comosum* as first described by him on p. 53. But the other *Panicum comosum* as described afterwards on p. 417 is mentioned on p. 458 with the addition: "mutetur in pycnocomum". The name *Panicum pycnocomum* STEUD. is once more mentioned in STEUDEL's Index on p. 462 with the data: "lege 417 loco: comosum". *Panicum pycnocomum* STEUD. is therefore a substitute name for the *Panicum comosum* described on p. 417 of STEUDEL's work and is a valid name, because it refers to a valid description under a wrong name. Being a *Setaria* and accepted as a species its true name is therefore **Setaria pycnocoma** (STEUD.) HENR., nov. comb.

There are in the genus *Setaria* important characters to distinguish various plants and in my opinion agrostologists have not always given the necessary attention to such characters. Many years ago when studying the various plants belonging to the well-known *Setaria verticillata* (L.) P. B., I noted already that there are characteristic differences between the plants from the tropical and from the temperate regions. Having formerly explained these differences in my own language, they did not receive the deserved attention by agrostologists, although STAPF cited my paper in his treatment of *Setaria verticillata* P. B. in the Flora of Tropical Africa.

The character I wish to memorate and elucidate here may be accepted as an example of the so-called law of Vavilov.

In *Setaria verticillata* (L.) P. B. the sheaths have hyaline margins, the latter are densely ciliate-pubescent from the insertion of the blade downwards, the hairs are often spreading and closely appressed. This characteristic pubescence is always well to observe by opening the sheaths cautiously with a needle. This character which seems to be very fugitive, is, however, present in all the specimens from the temperate regions and in those localities where the species is indigenous.

Going over tropical material of our species we observe that the hyaline margins of the sheaths are there quite glabrous. By this character it was possible to divide the *Setaria verticillata*, as commonly understood, into two sharp groups, each with a very different geographical distribution and such groups are worthy of specific rank. As I studied these characters in connection with the material of *Setaria verticillata* found in the Netherlands on ballast introduced from foreign countries, it was possible to recognize the tropical plants among them.

Studying the literature of this subject it appeared, however, that this discovery of mine had already been made by the famous botanist Alexander Braun, when he studied so extensively the species of the genus *Setaria*, although he placed this genus under the large genus *Panicum*.

A. Braun, who was director of the Botanical Garden at Berlin, unfortunately published his valuable critical study in the year 1871 as an *Appendix plantarum novarum vel minus cognitarum quae in horto regio botanico berolinensi coluntur*, to the seed catalogue of the Berlin Botanical Garden and his important paper enumerating all the known forms of *Panicum verticillatum* L. was consequently the easier overlooked by agrostologists.

Alexander Braun's observations are very important for the discrimination of the various forms of this species and even in modern time have not lost their value. The true *Panicum verticillatum* with its character: "vagina foliorum margine ciliato-pilosa", is indicated by Braun as "per Europam temperatam et meridionalem divulgatum". Sinai, Asia Minor and North America are further localities belonging to this *P. verticillatum*.

The plants with glabrous sheath-margins were identified by Braun as *Panicum Aparine* Steud. with its character: "vagina foliorum omnino glabra". Although this *Panicum Aparine* is very polymorphous and occurs in forms where sheaths are glabrous or pubescent, it is very curious that always the hyaline margins of these sheaths are glabrous.

Treating the British-Indian plants and those from Ceylon, Braun says expressively "vaginae foliorum inferiorum dorso praesertim et marginem versus pilosa, sed ipso margine non ciliata!".

In the modern light of the species concept, according to the very distinct and constant characters of the formerly accepted subspecies, supported by their distinct geographical distribution, we are certainly correct in accepting both as two separate species. One of them has, of course, to bear the name given by Linnaeus and becomes *Setaria verticillata* (L.) P. B.

Let us now look at the other species, which occurs in all the tropical regions of the world and was found also in a somewhat aberrant form in Java and described by Braun as var. *Miquelii* with Zollinger's number 2729 as type, which was, however, already earlier placed by Steudel under *Panicum respiciens* Hochst. from Abyssinia. This *P. respiciens*, however, does not differ in specific characters from Braun's variety *Miquelii* and is, moreover, also Steudel's *Panicum Aparine*. It was Chiovenda's opinion that this *Panicum Aparine* Steud. was a distinct species and there is nothing against his idea. Hence the name becomes *Setaria Aparine* (Steud.) Chiovenda. It is published in Nuov. Giorn. Bot. Ital. XIX (1912) p. 419. There is, however, an earlier name for this species. Sprengel described in the year 1825 a *Setaria Rottleri* which was based on *Panicum verticillatum* Rottler from Ind. Or.. Sprengel's description says nothing about the sheaths, although the type locality points certainly to *Setaria Aparine* Steudel and Rottler's *Panicum verticillatum* was a tropical grass. Braun takes up this *S. Rottleri* Sprengel as a distinct subspecies indicating the sheath-margins which are not ciliate. It is therefore very probable that Sprengel's name belongs to the tropical species and has priority above Steudel's name. Recently Stapf has given a list of synonyms of *Setaria verticillata* in the Flora of Tropical Africa. There this species is probably a mixtum of the two constant forms accepted by me as specifically distinct, but the character to distinguish the two geographical forms is not indicated. In the year 1919 Chiovenda mentioned our tropical species from Catanga under the name of *Setaria adhaerens* (Forsk.) Lk., a combination based on Forskahl's *Panicum adhaerens*, but the combination is Chiovenda's and not that of Link. This combination again is not mentioned in the Index Kewensis. Stapf gives *Panicum adhaerens* Forsk. as a synonym under *Setaria verticillata* P. B. and he cited also *Setaria adhaerens* Chiovenda.

In an earlier paper: The grasses of British Somaliland (Kew Bulletin no. 6, 1907, p. 214), STAPF accepted the Indian *Setaria verticillata* of HOOKER as a distinct subspecies under the name of *Setaria verticillata* P. B. subsp. *Aparine* A. BRAUN. This was indeed a far better opinion than the one accepted afterwards in the Flora of Tropical Africa. Although the type of FORSKAHL is not represented in his herbarium and the description is very short and says nothing about the principal character, it is rather evident that FORSKAHL's plant was the tropical *Panicum verticillatum*, so that we have to accept for this tropical species the name **Setaria adhaerens** (FORSK.) CHIOVENDA. This character of the indumentum of the sheath-margins is now also to apply to other polymorphous groups of the genus *Setaria*, where a renewed accurate study of the material will give us a better idea of the various species, as the variability in this genus is astonishing. I will for the moment only call attention to the perennial group to which belongs *Setaria macrostachya* H. B. K. The latter is commonly wrongly interpreted also in the Index Kewensis as a tropical Asiatic and Australian species. Described indeed by the authors of the Nova Genera from Mexico, this species is extraordinarily variable. American agrostologists have given their attention to this species, but did not disentangle the various forms. We have but to look at the various synonyms given by HITCHCOCK in his Manual on pag. 946.

If we study the plants from many localities from Mexico, the Southern United States and California, we find that commonly the sheath-margins are ciliately pubescent. Among the material at my disposal I had also PALMER's No. 125 from La Paz (Lower California), distributed as *Setaria caudata* BEAUV., but placed afterwards by HITCHCOCK under *Setaria macrostachya* H. B. K.

Apart from many other characters and a quite different habit, this plant of PALMER has quite glabrous margins of the sheaths and thus being an important parallel variation in the light of VAVILOV's law, it represents a distinct species too.

Fortunately this plant of PALMER was not overlooked by earlier American agrostologists and so we find PALMER's No. 125 as the type of *Chaetochloa rigida* SCRIBN. et MERR., U. S. Dept. Agr. Div. Agrost. Bull. 21 (1900) p. 30.

This characteristic species being a member of the genus *Setaria* cannot bear the specific name of *rigida*, because there is already a *Setaria rigida* STAPF from South Africa, published a year earlier. I therefore propose the name **Setaria Palmeri** HENR. nov. nom. for *Chaetochloa rigida* SCRIBN. et MERR. The good character of the glabrous sheath-margins is given by SCRIBNER and MERRILL in their description.

Among the neglected names in the Index Kewensis we find also another one for a species of *Eragrostis* which was renamed in the year 1913 *Eragrostis Scribneriana* HITCHC., as a substitute name for the *Eragrostis pusilla* of SCRIBNER, because there was already an *Eragrostis pusilla* by HACKEL.

There exists, however, a very interesting study of the genus *Eragrostis* by MATTEI from 1919, where this Italian author already recognized the same facts and therefore renamed *E. pusilla* SCRIBN. In this paper the species is named **Eragrostis Pringlei** MATTEI. I give here the complete synonymy of this Mexican species.

Eragrostis Pringlei MATTEI, Ricerche e studî sul genere Eragrostis in rapporto ai nettarii estranuziali per G. E. MATTEI e C. TROPEA. Contribuzioni alla Biologia vegetale, edite dal Prof. A. BORZI. Vol. IV. Fasc. II. Palermo. (1909) p. 241!

= *Eragrostis pusilla* SCRIBNER; BEAL, Grasses N. Amer. 2: p. 481, published in November 1896, non *Eragrostis pusilla* HACKEL, published in September 1896.

= *Eragrostis Scribneriana* HITCHCOCK: Mexican Grasses, in Contrib. U. S. National Herbarium. Vol. XVII. Part. 3. (1913) p. 361!

This species is allied to the well-known North American species *Eragrostis Frankii* C. A. MEYER ap. STEUDEL, Synops. (1854) p. 273, No. 145. The type is preserved in the Herb. Lugd. Bat. (No. 908.87—1700) with the label in STEUDEL's characteristic script reading: "Eragrostis Frankii FISCH. MEYER Hort. Petrop. Linn. 1844.193. Poa tenella Hrbr. un. it. 1835. Miami civitatis Ohio. Dr. FRANK."

American agrostologists accept as the same species *Eragrostis erythrogona* NEES ap. STEUDEL, described by STEUDEL in the same Synopsis under number 141 (priority of place). If this is indeed correct, why did not they call this species *E. erythrogona* NEES? The type specimen is collected by DRUMMOND and hails from St. Louis; I could not check it, but the description perfectly applies to what is commonly called *Eragrostis Frankii*. This is not known from Mexico, but represented there by the allied, although quite distinct *E. Pringlei*.

There occurs in the genus *Eragrostis* another neglected name for a very distinct species, a name not accepted in the Index Kewensis. It is a new valid name for a species, which I wish to treat here more in extenso, especially because the name belongs to a Javanese species of *Eragrostis*, which was found by me as a new member of the grassflora of that island.

This species now received various names and was often misunderstood. We find it already as *Poa chinensis* Link in the year 1821, renamed on account of *Poa chinensis* L. as *Eragrostis verticillata* Link, which is once more invalid on account of *E. verticillata* (Cav.) P. B.. In the year 1842 the species received the name of *Poa Purshii* Fischer, Meyer et A. Lall., which is invalid on account of Schrader's name. Afterwards the same species was accepted as a variety of *Eragrostis pilosa* (L.) Beauv. by Cosson and Balansa. The latter named the same species in 1867 *E. purpurascens,* overlooking Sprengel's name. Saccardo gave it in the year 1875 the name of *E. nigricans* overlooking the existing *E. nigricans* (H. B. K.) Steudel.

In the year 1881 we find the first valid name for this plant, as *E. pilosa* var. *Damiensiana* Bonnet, given in exsiccatae without description but published in the same year in "Le Naturaliste" 3e année, No. 52, p. 412—415.

This plant often occurs as an introduced one and so Ascherson and Graebner took up this species in their Synopsis as *E. caroliniana,* but the plant is not the *E. caroliniana* of Scribner, the latter based his species on *Poa caroliniana* Sprengel. American authors have recently accepted for Scribner's species the name of *E. pectinacea* (Michx.) Nees. This name *pectinacea* has formerly been misapplied to the perennial *E. spectabilis* (Pursh) Steudel. The species we are treating in this paper, is an annual weed.

Hackel accepted the plant as a var. *condensata* of *E. pilosa* and Kneucker published this name in his Gram. exsicc. (1901) No. 115. We cannot take up this name for our species. There is already an *Eragrostis condensata* Steudel.

As there existed no valid name for a species so often found as a weed in botanical gardens and on ballast in Central Europe, Thellung accepted in the year 1907 our plant as a subspecies of *Eragrostis pilosa* and took up Bonnet's name *Damiensiana,* making Hackel's *condensata* a variety of it.

In 1909 Massalongo gave the species the name of *E. Feriolana* as a synonym under *Eragrostis nigricans.* The species was also found on ballast in America introduced from Europe and Wiegand described this introduced plant in the year 1917 as *E. peregrina,* a name taken up by Thellung in the year 1919 as a synonym of his subsp. *Damiensiana.*

However, the above mentioned data are not sufficient to state the exact name of this species, for Thellung called in the year 1928 attention to the fact that Bonnet in the year 1881, when he published the *E. pilosa* var. *Damiensiana,* says in the text: "L'*E. Damiensiana* mihi (olim) n'a pas été signalé ailleurs", and THELLUNG had therefore in the year 1907 given this specific name also under his subspecies *Damiensiana.* In the year 1928 THELLUNG treated this species once more in extenso and observed that *E. Damiensiana* and *E. pilosa* are two well-defined species. BRIQUET had the opinion that the name *E. Damiensiana* given together with the subspecies of the same year (1907) is valid and that it is not correct to accept WIEGAND's name *E. peregrina* with *E. Damiensiana* BONNET ex THELLUNG as a synonym.

In THELLUNG's very good, critical study from the year 1928 we find exact determinations and a key for the introduced species of *Eragrostis* such as they are cited in ASCHERSON's Synopsis under *E. caroliniana.* They proved to belong to a number of different species, as *E. mexicana* LINK from America, *E. parviflora* (R. BR.) TRIN. from Australia and *E. suaveolens* BECKER from Russia. *E. Damiensiana* (= *peregrina*) is very exactly characterized in this paper and studying various herbaria THELLUNG found that it is a native of Asia, occurring from Japan to Indo-China. Now it is very curious that a species with such a rather large distribution in Eastern Asia was overlooked by earlier workers in this field. It was therefore quite accidentally that I came across interesting new facts.

Making in our institute some investigations on the genus *Glyceria,* I learned that STEUDEL described in the year 1854 a *Glyceria airoides* from Japan, citing our Institute as possessing the type ("Hrbr. Mus. Lugd. Bat.") with the name "Poa suzumeokatabica" as a synonym.

In our collections, however, which are well-preserved and practicably stored up, no such specimens were found under *Glyceria* nor under *Poa.* In STEUDEL's Index we find *Glyceria airoides* indicated on the correct page 287, but we find the addition p. 426 sub 40 b. On this page the species is once more described, but now as *Eragrostis multicaulis* STEUDEL with at the end of the description the words: "certe Glyceria airoides STEUDEL p. 287 nr. 35 quae delenda". Japonia.

Now our conclusion is that STEUDEL himself recognized that the species he formerly described as *Glyceria airoides* was indeed an *Eragrostis.* He could not give it the name of *airoides* under *Eragrostis,* on account of NEES's existing combination, known to him and treated in the same Synopsis on p. 275. He therefore changed the name into *E. multicaulis* giving at the same time a description. *E. multicaulis* STEUDEL is given in the Index Kewensis as being *E. pilosa* P. B.

Now STEUDEL's types of *E. multicaulis* were found in the cover of *E. pilosa,* because MIQUEL identified them (although wrongly) as *E. pilosa* P. B.

Two sheets in our herbarium bear a slip with the name "Poa suzumenokatabira Jap." STEUDEL's authentic label in his handwriting reads: "Glyceria airoides STEUD. Synops. est delenda est enim vera Eragrostidis species cum E. japonica valde congnata sed diversa. E. multicaulis STEUD. Synopsis Addenda." Another sheet in our herbarium bears only a label by STEUDEL "Glyceria airoides STEUD. Japonia".

Both names *Glyceria airoides* and *Eragrostis multicaulis* were given by the Japanese botanist HONDA as synonyms under *E. pilosa* P. B., probably on account of MIQUEL's identification. And therefore HONDA described the true *E. multicaulis* once more in the year 1927 as a new species, *E. Niwahokori* with the synonym *E. pilosa* STEUDEL non P. B.

HONDA's description and the characters given in his key under *E. Niwahokori* in the year 1930, prove that he described the true *E. multicaulis* (compare: "vaginae ad oras nudae. Rami inferiores ad basin non pilosi, cum pedicellis laeves"). This exactly agrees with STEUDEL's *E. multicaulis* and this name is the correct one for our species.

I have studied this species from a great many localities. Besides the Japanese material I saw this species from KNEUCKER's exsiccatae (No. 115 Hofgarten in Karlsruhe, Germany). Further as *Eragrostis verticillata* P. B. in REICHENBACH's Fl. Germ. No. 2122 (Steiermark, Gräz); Halle a. S. leg. Dr. GARCKE; Botzen in Tirol leg. OUDEMANS; Paris, cour du ministère de la guerre dans l'année 1867, leg. B. BALANSA; Toulouse, allées du Jardin des Plantes dans l'an 1873, leg. B. BALANSA and in PERSOON's herbarium as *Poa elegans* LAMARCK.

Two American specimens were studied; Maine, railroad ballast, Sagadahoc County, Bowdoinham, leg. FERNALD and BAYARD LONG in 1916 (No. 12666 as *E. pilosa*) and Pennsylvania, Plants of Lancaster County by A. A. HELLER in 1900 (as *E. Purshii* SCHRADER).

From the Asiatic region I saw the species from Taiwan (No. 11134) collected and distributed by TANAKA and SHIMADA (sub nom. *E. Niwahokori* HONDA). Important for the knowledge of the Javanese flora is that this species was also found there more than forty years ago, but it was never recognized. Good specimens seen from Java are:
Buitenzorg, leg. HALLIER No. 644a in 1893;
Tjikeumeuh, leg. HALLIER No. 645 in 1893;
Priangan, Melani, Paroengkoeda, alt. 1000 m. leg. BAKHUIZEN VAN DEN BRINK No. 446 in 1909 (nom. incol. djoekoet tai kajám);
Tjidadap, Tjibeber, alt. 1000 m. leg. BAKHUIZEN VAN DEN BRINK no. 1681 in 1916.

All these specimens were determined as *E. pilosa* P. B.

One of our well-known Old World species of *Eragrostis* was often accepted as *E. bahiensis* SCHRADER, a species from the New World. For this species the name *Eragrostis chariis* (STEUD.) HITCHC. was recently taken up in America. Now this species which occurs in Java, is as all the species of *Eragrostis* rather plastic and it is therefore no wonder that various described species belong in reality to but a single one.

ROXBURGH described a *Poa elegans* and a *Poa gangetica* both in the same year (1820). These two species belong to the genus *Eragrostis* and are to be combined; *Poa elegans* is invalid on account of the earlier *Poa elegans* of POIRET (1804) and therefore substituted by SCHULTES, who named the species *Poa chariis,* accepting that ROXBURGH's two species, cited above, were two different ones. Hence HITCHCOCK's new combination. But *Poa gangetica* ROXB. belongs to the same species and was wrongly placed by STAPF under *Eragrostis stenophylla* HOCHSTETTER. *Poa gangetica* ROXB. has priority above *Poa chariis* and is therefore to be accepted as the valid name, which becomes *E. gangetica* (ROXB.) STEUDEL. Under this name this *Eragrostis* finds its place among the other species of *Eragrostis* from Java.

Our common and well-known *Eragrostis major* HOST is another inhabitant of Java. There is an endless trouble and disagreement as to the correct name this species must bear. Most agrostologists have accepted the name *E. cilianensis* (ALLIONI) LINK ap. VIGN. LUT., based on *Poa cilianensis* of ALLIONI. This author described and figured his species. The figure in ALLIONI's work is as I could convince myself a rough wood-cut and so bad that one cannot identify it as an *Eragrostis,* the few-flowered spikelets with spreading flowers point as well to a species of *Poa*. The description on pag. 246 of the Flora Pedemontana is equally very bad, so that it is quite impossible to make out that we have here an *Eragrostis* before us. The description says that the branches of the panicle are ternate or quaternate, rarely single. We know that in *E. major* the branches are always solitary along the rhachis, whereas in the genus *Poa* there occur many species with such panicles as described by ALLIONI. We are therefore justified to accept ALLIONI's species as an ambiguous one. To accept a name as valid for a species we have various data which ought to agree. If there is a good plate from which the species is well recognizable, we have a solid basis for the species. The plate must be in accordance with the description, the latter prevails and small differences may be misinterpretations of the author and a minute character may be overlooked. In a description f. i. the spikelets of a grass are sometimes given as glabrous. In such cases the study of the type proves that they were minutely pubescent and the character was therefore not correctly verified. In the case of *Poa cilianensis*, however, there is an enormous contradiction between the plate and the description. There is in my opinion but one character given in the description that does not point to a *Poa*. ALLIONI gives the mouth of the sheath as pilose, a character not found in our species of *Poa*, but represented in various species of *Eragrostis*. But even if we accept that ALLIONI's species is an *Eragrostis*, we do not know from the description and the plate to what *Eragrostis* they belong. There are at least three species of that genus which occur in Italy; these species are, as given by their old names, *E. major* HOST, *E. minor* HOST and *E. leersioides* GUSS.

In such a difficult inextricable case there is a final decision by consulting the type, that is the specimen from which the author prepared his description, in which case an eventual bad plate may be well eliminated. We must be certain that we can verify the authentic type. And therefore we are justified to put the questions: is there any type existing and if so, who has studied it accurately?

I think that all botanists who had to do with the nomenclature of our *E. major* HOST, have their knowledge of this subject from TRACY HUBBARD's paper in the Philippine Journal of Science, C. Botany, Vol. VIII, No. 3, May, 1913.

HUBBARD says: "there seems to be no doubt as to the identity of the plant which ALLIONI describes. It was collected by BELLARDI on his father's estate of Ciliani in Piedmont and is a low-ground form of *E. major* HOST, *if we can believe subsequent authors.* The description is adequate and fair" (which is scarcely to endorse), "the plate worthless" (which is indeed so).".

HUBBARD says further that the definite status of the species, however, has definitely been settled by Doctor F. VIGNOLO LUTATI, who has examined specimens of *Poa cilianensis* ALL. in the herbaria of BELLARDI, BALBIS and BIROLI, all of them from the type locality and *presumably* received from ALLIONI, whose herbarium, at his death, became the property of BALBIS. For these reasons not verified by HUBBARD himself, he accepts the name *Eragrostis cilianensis* (ALL.) VIGN. LUTATI.

I now wish to call attention to the above cited paper of MATTEI and TROPEA from the year 1909. On pag. 222 MATTEI treated *Eragrostis megastachya* (KOEL.) LINK, which is our old well-known *E. major* HOST. He says verbatim: "Si è voluto riconoscere questa specie nella *Poa cilianensis* di ALLIONI, ma la figura che ne dà l'ALLIONI è talmente orribile, che puó ascriversi a molte specie diverse: il BERTOLONI aveva creduto di riconoscere in essa la *Poa trivialis.* Inoltre l'ALLIONI assegna alla sua specie infiorescenze con rami verticillati a 3 od a 4, e spighette per solito 3-flore, qualche volta 4-flore, per eccezione 5-flore, caratteri tutti che male si riferiscono alla vera *Er. megastachya.*"

These are the same arguments already discussed by me above, but MATTEI gives more information in a note reading: "ho veduto una nota, che mi era sfuggita, di VIGNOLO LUTATI F. Questa poco sposta la questione, essendo andati dispersi gli esemplari autopti dell'ALLIONI: è vero che nell' Erbario BELLARDI, raccoglitore della specie, ne esistono frustuli, verosimilmente riferibili ad *Er. megastachya,* ma anche i saggi raccolti dal RE, e ritenuti per *Poa cilianensis,* furono dal BERTOLONI riconosciuti spettanti ad una vera *Poa* e precisamente ad una forma anormale di *Poa trivialis.*"

This means that ALLIONI's own specimens were lost and that in the herbarium of BELLARDI, the collector of the species, there are fragments which belong to *E. megastachya,* but also the specimens collected by RE and taken for the *Poa cilianensis.* These were recognized by BERTOLONI as belonging to a true *Poa,* more exactly to an abnormal form of *Poa trivialis.*

MATTEI says further: "Purtroppo tutti gli antichi erbarii non offrono alcuna garanzia di autenticità: vi fu un periodo in cui sedicenti botanici non si fecero scrupolo di asportare o di sostituire esemplari, e di spostare etichette, come se ciò non dovesse apportare danno alla scienza: ora chi può rintracciare i veri saggi corrispondenti alle antiche etichette?"

There must have been a great disorder in these old Italian herbaria and the finding of *Poa trivialis* together with fragments of an *Eragrostis* explains all the characters given in the description of ALLIONI and how the artist who prepared the plate, gave an improvised figure. This plate being quite abominable and worthless, we have only to do with ALLIONI's own description, which points in nearly every respect to a species of the *Poa trivialis* group. On account of all these considerations it is necessary to drop ALLIONI's name. This is not unfortunate, because there exists a good name for *Eragrostis major,* the name *Eragrostis megastachya* LINK based on the *Poa megastachya* of KOELER. This name was formerly used by many agrostologists and there is no doubt about its correctness.

I have further to call attention to the fact that MATTEI recognizes *Eragrostis leersioides* (PRESL) GUSS. as a distinct species, much allied to and often confounded with *E. major.* He gives the differences in his key on pag. 218 and in a more detailed way on pag. 224. Many localities are mentioned under this species on pag. 229 and 230. A renewed study of this difficult group is highly wanted.

Eragrostis amabilis was based by WIGHT and ARNOTT on *Poa amabilis* L. and although they had a quite different species in mind (our *E. unioloides* [RETZ.] NEES), their combination is a valid one for the species formerly known as *E. plumosa* (RETZ.) LINK. Miss CAMUS in LECOMTE's Flore Générale de l'Indo-Chine is thus quite justified in accepting this name which is also accepted by HITCHCOCK in his well-known Manual. This name is also quite in accordance with the International Rules of Nomenclature. The species is rather common in Java. There occurs there a totally different species, which was accepted by STAPF in HOOKER's Flora of British India as *E. interrupta* BEAUV. (non R. et S. nec TRIN.). For this species HITCHCOCK accepts, however, the name *E. tenella* (L.) P. B. with the name *E. japonica* (THUNB.) TRIN. as a synonym. *Poa amabilis* L. is, however, the same as *Poa tenella* L., which is evident from the types in the herbarium of LINNÉ and *E. tenella* P. B. ex R. et S. is based on this *Poa tenella L.*. STAPF indeed united the two species *Poa tenella* and *Poa amabilis,* but *Poa amabilis,* having priority of place, described on an earlier page, is to be accepted as the valid name, if applied to a species of *Eragrostis.* It is therefore not allowed to apply the name *E. tenella* to another species of *Eragrostis,* as did HITCHCOCK.

Now this other species was described in the year 1784 by THUNBERG as *Poa japonica* and in the year 1791 as *Poa interrupta* by LAMARCK. If the two types of these species belong to but one species of *Eragrostis,* the correct name becomes *Eragrostis japonica* (THUNB.) TRINIUS. Now the types are rather different and belong at least to two varieties and renewed investigations by a monographer may prove that they belong to two different species, in which case it is necessary to clear up their nomenclature. The combination of TRINIUS is clear and safe being the earliest name and not used in a wrong sense. The combination *E. interrupta* is often wrongly based, because there was a *Poa interrupta* described by R. BROWN in the year 1810, a totally different species of *Eragrostis.*

In 1812 BEAUVOIS based his *E. interrupta* on LAMARCK's species, but LAMARCK's name is not cited by him. In 1817 ROEMER and SCHULTES gave in their Systema Vegetabilium Vol. II on p. 577 the name *Eragrostis interrupta* P. B., based on *Poa interrupta* R. BR. In BEAUVOIS's Index on p. 162 *Eragrostis interrupta* and many other names are mentioned with a question-mark. It is certain that in 1812 BEAUVOIS was acquainted with

LAMARCK's plants. ROBERT BROWN's species, published in 1810 were at that time scarcely known to European workers. Anyhow we are correct in accepting the combination *E. interrupta* (LMK.) BEAUV. as valid and other later combinations, f. i. *E. interrupta* STEUD. as belonging to a different species, being at the same time invalid for R. BROWN's species.

If we have to disentangle all the varieties of *Eragrostis japonica* (THUNB.) TRIN., we have to place LAMARCK's species under *japonica* and not the reverse, as did STAPF in HOOKER's Flora of British India. That we have here at least two different varieties is demonstrated by the different form of their panicles and other characters. The genuine *E. japonica* has a stiff panicle with whorled up to 5 cm long branches, which are spreading and branched from the base with divaricate branchlets and filiform or capillary pedicels. The spikelets are, moreover, but few-flowered. Such typical specimens of *E. japonica* are abundantly known from Java. The genuine *E. interrupta* has a long, lax and narrow panicle with semiwhorled, short and dense branches, which are erect or ascendent with short branchlets and shortly pedicelled, erect spikelets, the latter are many-flowered, flowers up to 12 or 14 per spikelet. Accepted as a variety it is to be named **E. japonica** (THUNB.) TRIN. var. **interrupta** (LMK.) HENR. nov. var. This variety occurs in Java too. Its habit is more like the African *E. namaquensis* NEES, which differs, however, in the smooth margins of the palea (compare NEES' statement: ,,valvula superior ad angulos laevis et glabra").

A very interesting perennial grass was described by TRINIUS in the year 1831 as *Eragrostis collina*. It received very recently the name of *Eragrostis arundinacea* ROSHEV., based on *Aira arundinacea* L. (1753) This name, however, is antedated by *Eragrostis arundinacea* JEDWABNIK, described in the year 1924 from North America. The new species of Miss JEDWABNIK is one of the many blunders of the school of MEZ as it is not an *Eragrostis* at all but belongs to the genus *Tridens* and is at the same time and old and well-known species, already described by LINNAEUS as *Poa flava* in 1753.

The genus *Tridens* is limited to the New World. One of the species, hitherto known as *Tridens Drummondii* (SCRIBN. et KEARN) NASH, based on *Triodia Drummondii* SCRIBN. et KEARN, published in 1897, must bear another name: **Tridens carolinianus** (STEUD.) HENR. nov. comb., based on *Festuca caroliniana* STEUDEL from the year 1854. STEUDEL's name was already taken up by Mrs. A. CHASE, who unites *Triodia* and *Tridens*. The latter, however, is a member of the *Eragrosteae*, whereas the former is to be placed in the tribe of the *Festuceae*. The other North American species of *Tridens* are already placed in that genus by NASH and others. The South American ones are treated by PARODI.

On account of JEDWABNIK's name that of ROSHEVITZ is invalid in *Eragrostis* and the latter must receive another name. Many authors have accepted *Eragrostis collina* as a member of the genus *Poa* and there is great disagreement as to its true taxonomic position. ASCHERSON and GRAEBNER place this species in their Synopsis, under *Poa* in a separate section "*Psilantha*", together with the annual *Poa persica* TRINIUS. This *Poa persica*, however, is better distinguished as a member of a distinct genus (*Eremopoa*), whereas *Eragrostis collina* is to be accepted as a species of *Eragrostis*. ASCHERSON and GRAEBNER accept the earlier name *Poa tatarica* FISCHER (1816) in which case its name under *Eragrostis* becomes **Eragrostis tatarica** (FISCH.) HENR. nov. comb.

Recently the genus *Avenastrum* being invalid is now accepted under the name of *Helictotrichon* BESSER. This is a well-defined genus especially represented in Europe and in Tropical and South Africa. The genus was studied in detail by HUBBARD and by SCHWEICKERDT. The island of Java has but a single species, described by BUSE. This species becomes **Helictotrichon Junghuhnii** (BUSE) HENR.. nov. comb. It is much allied to *Avena aspera* MUNRO ex THWAITES, from British India and Ceylon.

The synonymy of the latter is as follows: in *Avena,* MUNRO's name, given in THWAITES, Enum. Pl. Zeyl. (1864) p. 109 has priority although STEUDEL described this species already in the year 1854 as *Trisetum virescens* NEES. The epithet *virescens* in *Avena,* however, is not applicable on account of the already existing different species *Avena virescens* REGEL. In transferring MUNRO's species to the genus *Helictotrichon* we are, however, forced to accept STEUDEL's name as being the earlier one and the British Indian species becomes thus **Helictotrichon virescens** (NEES) HENR. nov. comb. based on *Trisetum virescens* NEES ap. STEUDEL.

Another species from the Nilghiri Hills belongs to the same genus and is proposed here as **Helictotrichon polyneurum** (HOOK. F.) HENR. nov. comb., based on *Avena polyneura* HOOK. F.

Avena virescens REGEL, accepted as being a species of *Trisetum* and named therefore *Trisetum virescens* (REGEL) FEDTSCH. ought to be renamed on account of the already existing *Trisetum virescens* NEES. I propose for this species of REGEL the new name **Trisetum Fedtschenkoi** HENR. nov. nom. based on *Trisetum virescens* (REGEL) FEDTSCH. (1914) non NEES ap. STEUDEL (1854).

Avena aspera MUNRO, as it is treated by HOOKER, in his Flora of

British India, is a very variable species and it consists in my opinion of a mixture of quite distinct minor groups, which are to be accepted as separate species. This is already evident from the various alternative characters mentioned by HOOKER and it is from all the data given by HOOKER not very easy to establish the various species, concealed under his *Avena aspera, proper.*

I have seen plants from the Khasia Hills and from Sikkim besides others from the Nilghiri Hills and also specimens from Yunnan. Striking differences are present in the form of the panicle and in the length of the spikelets, moreover also in the length of the ligules. This last mentioned character is of great importance in the genus *Helictotrichon* and together with characters of the blades, used with succes for the discrimination of various much allied, although quite distinct species. Recently a fine treatment of the grasses was published in the Flora of the U. S. S. R. by KOMAROV and his co-operators. The study of such a work, how interesting it may be, is greatly hampered on account of the Russian language in which the flora is written. We learn from it only the genera with the various species and the synonyms. The keys for the species cannot be consulted by botanists who are not familiar with that language.

Another recent work where MUNRO's species in treated is HANDEL-MAZZETTI's Symbolae sinicae. Here (l. c. p. 1293) *Avena aspera* is treated as *Avenastrum asperum* (MUNRO) HAND.-MAZZ., a combination invalid on account of the much earlier *Trisetum virescens* STEUD. At the same time a var. *Roylei* (HOOK. F.) HAND.-MAZZ. is given with *Avena Delavayi* HACK. as a synonym. I examined *Avena Delavayi* HACK. from Yunnan published in HACKEL's Neue Gräser (Oest. Bot. Zeit., 1902, No. 5, p. 189). HACKEL gave a long description and compared his species with the European *Avena versicolor* VILL.

We fully agree that HACKEL's *Avena Delavayi* and VILLAR's *Avena versicolor* are two quite distinct species; as to his *A. Delavayi*, HACKEL observed in his own herbarium afterwards that his species was a small narrow-leaved variety of *Avena aspera* MUNRO, mentioned by HOOKER as var. *Roylei.* The material from British India seen by me and cited above has very short ligules, scarcely ½ mm long, in HACKEL's species the ligules are 1½ mm long and very distinct, in one of my specimens from DELAVAY even 2 mm in length. The spikelets are much smaller than commonly in *Avena aspera* MUNRO and in my opinion these plants from Yunnan are not at all only a small narrow-leaved highland form of MUNRO's species. Such an interesting "form" is moreover not a variety, but by its striking characters, so often used in the genus with great profit, to be accepted as a distinct species.

I do not hesitate to accept for this species the name **Helictotrichon Delavayi** (HACK.) HENR. nov. comb., based on *Avena Delavayi* HACK. It may be that HOOKER's variety *Roylei* belongs to HACKEL's species, although some characters in HOOKER's description do not point to HACKEL's species. HOOKER says: panicle glabrous (or puberulous), flowering glumes 2-fid almost to the awn into acuminate or long-awned lobes (or split into 3—4 short unequal bristles). The characters given inter parenthesis do not apply to HACKEL's species, and HOOKER's variety is a mixture of different things. However this may be, the existence of HOOKER's earlier variety does not invalidate at all the standing of HACKEL's plant as a species.

HACKEL's species is in its habit more allied to the plants from the Nilghiri Hills. These plants were published by HOOKER as var. *Schmidii* with the observation: Possibly a distinct species. This variety differs from HACKEL's species in the very short ligules and in the chiefly radical tuft of leaves, more contracted panicle, short rachis and branches and very short pedicels. The spikelets are of the same length. For this endemic species from the Nilghiri Hills I propose the name **Helictotrichon Schmidii** (HOOK. F.) HENR. nov. comb., based on HOOKER's varietal name under *Avena aspera* MUNRO.

Helictotrichon as a genus is always easily recognizable, but the treatment of the about 80 species all over the world is not an easy task and ought to be undertaken by a monographer on the basis of the modern species concept. This inquires renewed investigations from the types which are scattered through the various institutes of the world and at the moment cannot be brought together. Such a work was undertaken by SAINT YVES in a paper: Contribution a l'étude des Avena sect. Avenastrum, published in the year 1931 in Candollea Vol. IV. p. 353—498.

In this work I am disappointed. Being a pupil of the histotaxic school of DUVAL-JOUVE, SAINT YVES has given much weight to the anatomical characters of the blades. Although SAINT YVES says that he tried "à connaître les ressemblances dans les choses diverses et les différences dans les choses semblables", his method for a monographical study is wrong. For histotaxic investigations it is in my opinion, wrong to rely on material in our collections and on the current names given to that material. To be sure that our conclusions are correct, we have in the first place to look for the actual types of all the species supposed to belong to a genus that we wish to disentangle. All the types are to be checked with the authentic descriptions and localities and the various data ought to be ascertained. After this work, all the other material at hand ought to be carefully studied and identified and deviations from the type material are to be fixed. A monographical study should be prepared first of all on morphological foundations. When such a work is done we can pass on to anatomical investigations and execute them first on the types of the various species. Only in such a case we are absolutely safe that anatomical characters found by us correspond to the correct species. SAINT YVES treated 21 species, many types were not seen by him and in other cases material named in herbaria was studied in the supposition that it was correctly identified. A great many species are thrown together, neglecting the constant and important differences. Many good and characteristic species are by this treatment concealed under the innumerable amount of varieties and are thus practically lost. A next investigator is thus forced to do once more a great amount of work and has to execute once more all the anatomical work on the basis of the type specimens. If in such a work, as prepared by SAINT YVES, various correct conclusions are obtained, without being verified with the types, it is more by hit than by wit; but in monographical work we can leave nothing to chance. SAINT YVES's method, at present still often propagated is putting the horses behind the carriage.

TRABUT, who did not neglect the anatomical structure of the leaves of various grasses of North Africa, demonstrated clearly that the leaf structure of various species of *Stipa* as *Stipa gigantea, Stipa juncea, Stipa Lagascae* and *Stipa capillata* is completely realized in various perennial species of *Avena* from the section *Avenastrum*, such as *Avena convoluta* and *Avena filifolia.* Their anatomical structure is so uniform that without inflorescences these plants cannot be distinguished although in this case they belong to two quite different genera. TRABUT has demonstrated this with figures in Bull. Soc. bot. de France Tom. XXXVI (1889) p. 404—412.

The anatomical structure in *Avenastrum* shows two principal types, one with flat leaves, the other with junciform ones. In these two groups the anatomical differences are at once distinct although the differences are at first sight also obvious to a taxonomist. To divide those two groups TRABUT was, however, forced to use in an analytical key, only characters taken from the floral parts as glumes and lemmata, hairs on the callus, number of flowers etc., all used already with succes by taxonomists for an incorporation.

An interesting species was described by Miss CAMUS from Madagascar with only two flowers per spikelet. It is **Helictotrichon Humbertii** (Camus) Henr. nov. comb., based on *Avenastrum Humbertii* Camus.

There are three species of *Helictotrichon* in North America. For the incorporation in our herbaria they have to bear the following names: **Helictotrichon pubescens** (Huds.) Pilger; **Helictotrichon Hookeri** (Scribn.) Henr. nov. comb., based on *Avena Hookeri* Scribner and **Helictotrichon Mortonianum** (Scribn.) Henr. nov. comb. based on *Avena Mortoniana* Scribner. The South American *Avena scabrivalvis* Trin. is according to Swallen an *Amphibromus*.

Other interesting species of the genus *Helictotrichon* are the following:

Helictotrichon Fedtschenkoi (Hack.) Henr. nov. comb. based on *Avena Fedtschenkoi* Hack. from Turkestan.

Helictotrichon Schellianum (Hack.) Henr. nov. comb. based on *Avena Schelliana* Hack. in the Ural.

Helictotrichon asiaticum (Roshev.) Henr. nov. comb. = *Avenastrum asiaticum* Roshev.

Helictotrichon tianschanicum (Roshev.) Henr. nov. comb. = *Avenastrum tianschanicum* Roshev. from Turkestan.

Helictotrichon albinerve (Boiss.) Henr. nov. comb. = *Avena albinervis* Boiss. from Portugal and Spain.

Helictotrichon adzharicum (Albov) Henr. nov. comb. = *Avena adzharica* Albov in Acta Horti Tifl. Suppl. I (1895) p. 257.

Helictotrichon armeniacum (Schischk.) Henr. nov. comb. = *Avena armeniaca* Schischk.

Helictotrichon asiaticum (Roshev.) Henr. nov. comb. = *Avenastrum asiaticum* Roshev. This is the *Avena versicolor* of the Asiatic authors which is different from the European species.

Helictotrichon dahuricum (Komar.) Henr. nov. comb. = *Avena dahurica* Komar. This is the *Avena planiculmis* of Turczaninov as mentioned in his Fl. baic. dahur. III (1856) p. 322, not *Avena planiculmis* Schrader from Central Europe. I had an authentic specimen of Turczaninov at my disposal from the Leningrad herbarium. We have here the case that the differences between two much allied species are supported by a very distinct geographical distribution as has already so often been demonstrated by me.

Helictotrichon compressum (Heuff.) Henr. nov. comb. = *Avena compressa* Heuffel from Southern Europe and North Africa.

Helictotrichon bromoides (Gouan) Henr. nov. comb. = *Avena bromoides* Gouan from Southern Europe and North Africa.

Allied to this is **Helictotrichon Letourneuxi** (TRAB.) HENR. based on *Avena Letourneuxi* TRABUT from Tunis.

Helictotrichon Hackelii (HENRIQUES) HENR. nov. comb. = *Avena Hackelii* HENRIQUES from Spain.

Helictotrichon setaceum (VILL.) HENR. nov. comb. = *Avena setacea* VILLARS, French Western Alps.

Helictotrichon compactum (BOISS. et HELDR.) HENR. nov. comb. = *Avena compacta* BOISS. et HELDR. in Greece.

Helictotrichon agropyroides (BOISS.) HENR. nov. comb. = *Avena agropyroides* BOISS. in Greece.

Helictotrichon filifolium (LAG.) HENR. nov. comb. = *Avena filifolia* LAGASCA from Southern Spain and North Africa.

Much allied is **Helictotrichon convolutum** (PRESL) HENR. nov. comb. based on *Avena convoluta* PRESL from Italy.

Helictotrichon decorum (JANKA) HENR. nov. comb. = *Avena decora* JANKA from the Carpathians.

Helictotrichon sulcatum (GAY) HENR. nov. comb. = *Avena sulcata* J. GAY from Spain, Portugal and Western France.

Helictotrichon montanum (VILLARS) HENR. nov. comb. = *Avena montana* VILLARS from Spain, Central and Western France.

Helictotrichon macrostachyum (BALANSA) HENR. nov. comb. = *Avena macrostachya* BALANSA, pl. alg. exsicc. no. 718, is a very fine North African species.

Helictotrichon breviaristatum (BARR.) HENR. nov. comb. = *Avena breviaristata* BARRATTE ap. BATTANDIER et TRABUT Fl. de l'Algérie (1895) p. 184 is a curious North African species, characterized by its very short included awns..

Helictotrichon pruinosum (HACK. et TRAB.) HENR. nov. comb. based on *Avena pruinosa* HACKEL et TRABUT and

Helictotrichon Requienii (MUTEL) HENR. nov. comb. based on *Avena Requienii* MUTEL, are two species from Oran.

Helictotrichon Neumayerianum (VIS.) HENR. nov. comb. = *Avena Neumayeriana* VISIANI from Albania and Dalmatia.

Helictotrichon Blauii (ASCH. et JANKA) HENR. nov. comb. = *Avena Blauii* ASCHERSON et JANKA (1877). This species from the Balkan is indicated by ASCHERSON and GRAEBNER in their Synopsis as occurring in Tirol (l. c. p. 257). This is, however, wrong as the genuine *Avena Blauii* does not occur in Tirol. The plant from the latter locality is a variety of **Helictotrichon pratense** (L.) PILGER accepted by me as var. **pseudolucidum** (HAUSM.) HENR. nov. comb.

Helictotrichon alpinum (SM.) HENR. nov. comb. = *Avena alpina* SMITH (1811).

Helictotrichon Krylovii (PAVL.) HENR. nov. comb. = *Avenastrum Krylovii* PAVL. in Animadv. syst. Herb. Univ. Tomsk. no. 5—6 (1933) p. 1.

Helictotrichon hissaricum (ROSHEV.) HENR. nov. comb. = *Avenastrum hissaricum* ROSHEV. in Bull. Jard. Bot. Acad. Sc. U. R. S. S. XXX (1932) p. 770.

Helictotrichon mongolicum (ROSHEV.) HENR. nov. comb. = *Avena mongolica* ROSHEV. in Bull. Jard. Bot. Princip. XXVII (1928) p. 96.

For a new treatment of the grasses of Java, I have once more studied the genera *Brachiaria* and *Urochloa.* These two genera are well established, although the position of the spikelets being adaxial or abaxial is not always at once evident, especially in dried material. Here we have at first the common *Panicum reptans* L., accepted by STAPF as an *Urochloa* and very recently by GARDNER and HUBBARD as a *Brachiaria.* American authors although accepting the genus *Brachiaria* are still going on to accept this species as a true *Panicum,* because they limit the genus *Brachiaria* not only to those species, where the spikelets are placed with the back of the fruit turned away from the rhachis of the racemes, but also being at the same time solitary. Compare *Brachiaria extensa* CHASE, *Brachiaria plantaginea* (LINK.) HITCHC. etc. In STAPF's treatment of the African species of *Brachiaria* there are many species with binate spikelets, in which case one of them is sometimes rather long pedicelled.

For *Panicum reptans* L., occurring also in Java, we had therefore to take a decision, and I studied the case once more, going over all the material available. In the sessile spikelets of each pair the situation is clear, the first small glume is adaxial, turned towards the rhachis, but in the pedicelled spikelets it seems that they are abaxial, turned away from the rhachis. Now this character, abaxial or adaxial, is not always sharply to determine in dried material on account of a torsion of the pedicel after drying or pressing the plants and the character is therefore more evident in fresh material. By soaking inflorescences in water we observe, however, that the true position is better to understand, as the spikelets are then coming in their old true position. I now agree with Mr. HUBBARD that several species formerly placed in the genus *Urochloa* indeed belong to the genus *Brachiaria* and that our javanese

Panicum reptans L. must therefore bear the combination *Brachiaria reptans* (L.) GARDN. et HUBBARD.

The genus *Urochloa* is thus hitherto not represented in Java. At the same time a number of species are grouped together where the spikelets have more agreement as to form and outline. Mucronate or awned lemmata occur in both genera.

Among the species of *Brachiaria* is also the *Brachiaria epaleata* STAPF, published in the year 1919, as a new name for RICHARD's *Panicum nudiglume*, which is different from the true *Panicum nudiglume* HOCHSTETTER published earlier (in 1844). STAPF overlooked that his species was already described in the year 1917 by MEZ as *Panicum secernendum* HOCHSTETTER, a manuscript name validated by MEZ and published with a description. Hence this species becomes **Brachiaria secernenda** (HOCHST.) HENR. nov. comb.

Another interesting species of *Brachiaria* was formerly received by me from my late friend Prof. A. S. HITCHCOCK, who collected it in grassland near Eldoret in Kenya. It was accepted by him as *Brachiaria soluta* STAPF, but although belonging to the section of the "*reticulatae*", it differed by the not herbaceous and not ribbonlike rhachis of the racemes and by other characters of the spikelets.

Not having sufficient material for comparison at my disposal, I asked Mr. HUBBARD at Kew for his opinion. I have to thank him for his valuable advice and his willingness to compare my new species with other members of the group of the *reticulatae*. This new species is proposed here as

Brachiaria keniensis HENR. nov. spec. — Caespitosa, sine stolonibus. Culmi erecti, paucinodes, infra nodis barbati sed nodi ipsi glabri. Vaginae foliorum glabrae, leviter scaberulae, marginibus pilosis, ligula brevissima, ciliolata, pilis stipata. Laminae planae, ad 7 mm latae, 10 cm vel plus longae, caulinae ad 4 cm tantum longae. Pedunculus leviter pubescens, inflorescentia pinnata, 6—7 cm longa, axis communis triqueter, dense setigera, rami 3—4, 1.5—2.5 cm longi, dense floriferi, circa ½ mm lati, dense pubescentes, pilis setigeris intermixtis; spiculae dense agregatae, subsessiles, subsecundae, circa 4½ mm longae; gluma I scaberrima, spicula $^1/_5$ brevior, lata, purpurea, multinervosa, nervis circa 13, parallelis; gluma II superior 8—9-nervia, hyalina, albida, nigropunctata, subacuminata, pilis longis hyalinis sparsis obtecta, reticulata; flos inferior neuter vel masculina, 4 mm longa, bipaleacea, palea inferior hyalina, reticulata, 5—7-nervia, ut in gl. II pilis obtecta, acuminata, palea superior hyalina, glabra, acuminata, circa 5(—7)-nervia; flos superior hermaphrodita, lemma obtusa sed mucronula distincta praedita, longitudinaliter punctulata vel leviter subreticulata, albidula, subnitens, coriacea.

Kenya Colony: Eldoret, Sept. 20. 1929 in grassland leg. A. S. HITCHCOCK No. 24998. Typus speciei in Herb. Lugd. Bat. sub No. 932.28—150.

This species is most allied to *Brachiaria dictyoneura* (FIG. et DENOT.) STAPF, but differs in the wider 13-nerved lower glume, the smaller spikelets and the distinct mucro at the summit of the fertile lemma, also allied to *Brachiaria viridula* STAPF from which it differs in the larger 13-nerved lower glume and slightly larger spikelets and in the longer mucro of the punctulate, not smooth lemma. *Brachiaria humidicola* (RENDLE) SCHWEICK. has a different habit, being a stoloniferous perennial.

To *Brachiaria keniensis* HENR. belongs also a specimen from Nyassa, Kyimbila, collected by A. STOLZ in 1912 (no. 1091). It was placed by MEZ under *Panicum jubatum* FIG. et DENOT. (*Brachiaria jubata* STAPF) and is a certainly much allied species from Kordofan. It differs according to the figures, given by FIGARI and DENOTARIS in the very long hairs of the racemes, which are as long as the spikelets.

There is another puzzling question as to the place of a common species of *Panicum* in the system of the *Panicoideae.* It is the species commonly known as *Panicum barbinode* TRIN.. *Panicum purpurascens* RADDI from the year 1823 also described from Brazil is an earlier name, but not accepted on account of the earlier *Panicum purpurascens* OPIZ (1822). HITCHOOCK has demonstrated that OPIZ's name is a nomen nudum and therefore RADDI's name is the valid one. American agrostologists have accepted this name. STAPF identified this species with LAMARCK's *Panicum numidianum* and also with FORSKAHL's *Panicum muticum.* BLATTER, in his Revision of the Flora of the Bombay Presidency, accepting *Brachiaria mutica* (FORSK.) STAPF says that "in adopting FORSKAHL's name "*muticum*" for this species, STAPF, according to his own words, has relied on ASCHERSON's identification of the type with the Algerian *P. numidianum*". Now in so much allied plants such identifications ought to be given by good figures of the spikelet characters, as is done by HITCHOOCK and CHASE in their beautiful study of the American species of *Panicum* and *Paspalum.* Now the species of LAMARCK was examined by HITCHOOCK in the LAMARCK herbarium at Paris. He found that this type did not agree in all respects with the type of *Panicum barbinode* TRIN.

HITCHCOCK gives as the most important differences, that the lower glume in LAMARCK's plant is longer and 3-nerved instead of 1-nerved, the pedicels of the stalked spikelets are longer, and the rhachis lacks the long hairs of *P. barbinode*. If we look at the material in our herbaria we find that specimens agreeing with LAMARCK's type exist, especially the 3-nerved, longer, lower glume is noticeable.

As to FORSKAHL's plant HITCHCOCK and CHASE observe that the identity of this species is uncertain, the description is insufficient to identify it. The type, collected at Rosetta and said to be allied to *Panicum colonum* is represented in FORSKAHL's herbarium at Copenhagen, but STAPF did not indicate that he verified this type. So far as our knowledge goes at the moment, there are two much related, but distinct species, the one is *Panicum numidianum* LMK. and the other *Panicum purpurascens* RADDI. Only the latter occurs in Java, it is a native of Brazil, cultivated throughout subtropical and tropical regions as "*Para grass*" and is often escaped from cultivation. Placed by HITCHCOCK and CHASE in the group of the "*geminata*" it does not belong there but is a member of the genus *Brachiaria*, whereas the two other species of the "*geminata*", *Panicum geminatum* and *P. paludivagum* are members of the genus *Paspalidium* and have to bear the names of **Paspalidium geminatum** (FORSK.) STAPF and **Paspalidium paludivagum** (HITCHC. et CHASE) HENR. nov. comb. based on *Panicum paludivagum* HITCHC. et CHASE (North America, in Florida and Texas, to Mexico and Guatemala. South America, Uruguay and Argentina).

The two species of *Brachiaria* may be accepted as **Brachiaria numidiana** (LMK.) HENR. nov. comb. for the Egyptian plant and **Brachiaria purpurascens** (RADDI) HENR. nov. comb. for the well-known Para grass. Very recently HITCHCOCK has once more, and sharper published his opinion about these two species in his Manual of the grasses of the West Indies. In HITCHCOCK's opinion *P. purpurascens* is different from *P. numidianum* to which *P. muticum* should probably be referred. The Egyptian plant differs in having pubescent, but not villous nodes, more acute spikelets, no long hairs on the rhachis and pedicels, and a larger first glume. I agree perfectly with this opinion, having compared North African material. The renewed exact examination of FORSKAHL's type is necessary to solve this problem. At the moment we have no access to this valuable type.

Having seen the type and duplicates from HACKEL's interesting *Panicum Venezuelae* (EGGERS no. 13471), which was placed by the eminent agrostologist already in the subgenus *Brachiaria,* I wish to make the combination **Brachiaria Venezuelae** (HACK.) HENR. for the incorporation of this species in our herbarium.

The orientation of the spikelets in *Brachiarias* with undivided branches and shortly pedicelled spikelets is readily ascertained as is clearly demonstrated by HUBBARD; in many other members of this genus, the adaxial arrangement is obscured and difficult to determine. In *Brachiaria Venezuelae* we have a quite similar case as in *Panicum reptans.* Most of the spikelets of the groups along the branches have a lower glume turned towards the rhachis, at least the shortly pedicelled ones; in the longer pedicelled spikelets at the end of the branchlets and at the summit of the branches it does not show this position so clearly, because these spikelets are protruding above the axis. In the dried material the position of the spikelets is somewhat altered by torsion. An exact examination demonstrates, however, the same position as in so many other species of the genus *Brachiaria.* The general form of the spikelets in *Brachiaria Venezuelae* and especially the fertile lemma, agree better with other members of this genus and do not fit among the characters of the genus *Urochloa.* For these reasons I placed the species of HACKEL in the genus *Brachiaria.*

In New Caledonia there occurs another species of this genus, which was described by MEZ as *Panicum patulum,* a name which is not valid on account of the earlier *Panicum patulum* (SCRIBN. et MERR.) HITCHC. For the species of MEZ I propose the name **Brachiaria Balansae** HENR. nom. nov. based on the species as described by MEZ.

Another species from New Caledonia was described by MEZ as *Panicum elegantulum.* This plant belongs to the genus *Paspalidium,* for which I make the new combination **Paspalidium elegantulum** (MEZ) HENR. nov. comb.

Panicum glabrinode HACK. in Annuaire du Conservatoire et du Jardin botaniques de Genève, Vol. XVII. p. 284 and compared by him with *Panicum numidianum* LAMK. and *Panicum barbinode* TRIN., is a member of the genus *Brachiaria,* for which the name **Brachiaria glabrinodis** (HACK.) HENR. nov. comb. is to be accepted.

Panicum oligobrachiatum PILGER was described from the Lower Congo near Bonga and was collected by SCHLECHTER (no. 12663). I saw this number and the species is certainly a member of the genus *Brachiaria.* STAPF treated it in the Flora of Tropical Africa but did not transfer it to the genus *Brachiaria,* probably on account of the wanting lower parts of the existing type material. For the intercalation of the species it has to bear the name **Brachiaria oligobrachiata** (PILGER) HENR. nov. comb. It is not mentioned by ROBBIJNS in his Flore Agrostologique du Congo Belge, II, Panicées.

A few other species of *Panicum* from South Africa, already placed by its author in the section *Brachiaria,* are here transferred to that genus.

Brachiaria bulawayensis (HACK.) HENR. nov. comb. based on *Panicum bulawayense* HACK.

Brachiaria melanotyla (HACK.) HENR. nov. comb. based on *Panicum melanotylum* HACK.

Brachiaria glomerata (HACK.) CAMUS (Bull. Soc. Bot. France, T. 77, 1930, p. 640) based on *Panicum glomeratum* HACK. is omitted in Index Kewensis.

Panicum pubifolium MEZ is invalid on account of the earlier valid combination *Panicum pubifolium* NASH in 1894. I propose for MEZ's species the name of **Brachiaria ukambensis** HENR. nom. nov. based on HILDEBRANDT's type from Ukamba (no. 2665).

In the genus *Cyrtococcum* there is still much confusion and the various species ought to be studied and revised on a new basis. The genus as a whole is very distinct and always easily recognizable. It therefore seems rather bold to accept a new species in this genus as did HACKEL in describing his *Panicum Schmidtii* from Siam where other species of this genus are abundant. Miss CAMUS accepted HACKEL's species as a variety of the very variable *Cyrtococcum patens* (L.) CAMUS. But here I cannot follow her. *Panicum Schmidtii* is distinguished from all the other members of the genus *Cyrtococcum* by the very curious indumentum of the spikelets, the latter are moreover the smallest in the genus and scarcely 1½ mm long, they are provided with extremely characteristic verrucas, which resemble a small toadstool. This character is very exactly expressed in the author's description as "verrucis crebris elevatis breviter piliferis obsita". This species is not limited ti Siam. I saw it also from British India in the Bombay Presidency, collected by YOUNG in Southern Maratha County and North Canara. It is certainly overlooked as it occurs also eastward to Indo-China. Belonging to the genus *Cyrtococcum* we have to place it there as **Cyrtococcum Schmidtii** (HACK.) HENR. nov. comb.

There occur in Java two species of *Agrostis* of the group where the palea is wanting. Both were exactly described by BUSE and they are well recognizable. Their synonyms are the following: REINWARDT named in his herbarium a species as *Agrostis montana,* a name he did not publish. His specimen with an authentic label in our herbarium reads: "Pontjac gedée, Agrostis montana RWDT". VAN HALL added to this specimen: "non R. BR." and named this specimen *Agrostis Reinwardtii* v. HALL mss. Meanwhile BUSE, who had no access to this plant, described the same species as *Agrostis stricta* BUSE (Feb. 1854) p. 341 in Plantae Junghuhnianae from good specimens collected by JUNGHUHN, but overlooked that there was already a species of this name by TRINIUS. (There is moreover also an *Agrostis stricta* by WILLDENOW from the year 1797). BUSE received afterwards the authentic specimen of REINWARDT with VAN HALL's manuscript name. This specimen bears also a label by BUSE reading: "Agrostis Reinwardtii H. L. v. HALL mss. BUSE in Pl. Reinw. p. 98. Agr. stricta Buse in Pl. Jungh. p. 341. Speciei auctor. Specimina auth. Pl. Reinw. p. 1." MIQUEL published these data in his Addenda to the 3th volume of his Fl. Ind. Batavae p. 750 with a reference to *Agrostis stricta* BUSE on p. 377 of his Flora, as follows:

"Agrostis stricta BUSE, sed non TRIN. Agrostogr. II p. 97 = Agrostis Reinwardtii H. C. v. HALL. in sched. herb. Reinw. — BUSE in Pl. Reinw. p. 98 (A. montana REINW. herb. non R. BR.)".

From these citations it is evident that BUSE's second publication was known to MIQUEL, a publication given in the year 1856 by G. H. DE VRIESE, Plantae Indiae Batavae orientalis. Fasc. I et II Gramineae auct. L. H. BUSE. This publication has therefore priority above MIQUEL's data.

BUSE gave in this publication the full data as follows:

"Agrostis Reinwardtii H. L. v. HALL in schedula mss. BUSE. Agrostis (Trichodium) stricta BUSE in Pl. Jungh. p. 341, speciei auctor. Non Agr. stricta TRIN. agr. II. p. 97. Agr. montana RWDT. in sched. herb. mss. Non Agr. montana R. BROWN Prod. Fl. Nov. Holl. p. 171. Habitat insulam Javae ubi in planitie centralo montium Gedeh prima vice ao. 1818 legit RWDT. Simili loco montis Mandalawangi postea Jungh. 1. op. 1. Speciem descripsi in pl. Jungh. 1.1. At nomen "strictae" non fauste adhibui qua scilicet denominatione jam TRINIUS antea plantam designaverit Chilensem."

The name *Agrostis Reinwardtii* v. HALL therefore is a substitute for BUSE's *Agrostis stricta* and is the valid name of this Javanese grass, therefore the citation of this name in the Index Kewensis is incorrect. This species is easily recognizable from BUSE's very good description by its perfectly smooth panicle branches and pedicels and by its larger spikelets, from BUSE's *A. infirma*, which has very distinctly scabrous panicle branches and smaller spikelets. We know how accurate an observer BUSE was. I have explained these data here more in detail, not only for a new treatment of the grasses in BACKER's Handboek, but also because there is still another difficulty. We know that MIQUEL has taken up in his well-known Flora a third species of *Agrostis,* which has been described by STEUDEL in the year 1854 (posterior of BUSE) as *A. rigidula,* giving as his type a plant collected by ZOLLINGER (No. 2589). MIQUEL indicates that he did not see it.

This is quite correct, because the plant of ZOLLINGER is wanting in our collections. But KOORDERS accepted STEUDEL's species, which is described as having scabrous panicle branches but with a distinct palea, a character given also by MIQUEL. KOORDERS identified plants found by him as *Agrostis rigidula* STEUDEL. These plants are in our herbarium, but a new examination proved that in KOORDERS's plants the palea is totally wanting and his plants do not differ from BUSE's *Agrostis infirma.* I do not know how KOORDERS could determine his plants as STEUDEL's species, without having an authentic specimen at hand. It may be that he consulted only MIQUEL's Flora and did not verify the character of the wanting or present palea. Nevertheless we do not know exactly at this moment what species STEUDEL described. There are two possibilities. STEUDEL had one of the specimens of BUSE and overlooked the wanting palea, or he had indeed an *Agrostis* with a distinct palea before him. Because the lemmata in *Agrostis* are rather small, it not rarely occurs that in the dissections the thin lemma tears and without utmost care, a small part of the true lemma may be taken for the palea, as the lemma splits lengthwise rather easily. Fortunately the name *Agrostis infirma* BUSE is quite safe as given in 1854 before the publication of that part of STEUDEL's work, where *A. rigidula* is issued. But if STEUDEL's *A. rigidula* proves to be the *Agrostis stricta* of BUSE, then *A. rigidula* has priority above *Agrostis Reinwardtii* v. HALL. There is, however, another possibility that STEUDEL's species had indeed a well-developed palea, in which case it may belong to the European *Agrostis stolonifera* L.

This *Agrostis stolonifera* L., as sharply limited by PHILIPSON in his important recent revision of the British species of the genus *Agrostis,* is known from Java, where it was found on the West slope of Mount Tengger between 1300—1600 m above sea-level, according to Dr. BACKER, probably escaped from cultivation in the year 1907 from Mr. BUYSMAN's garden. There is no indication that this *Agrostis stolonifera* was an inhabitant of Java in earlier times, when ZOLLINGER collected in Java. The study of the type of STEUDEL may solve this problem and we have for the moment to accept the names *Agrostis infirma* BUSE and *A. Reinwardtii* v. HALL. The former is only seen by me from Java, while the latter was collected by CLEMENS in British North Borneo.

These Bornean plants do not differ from the Javanese ones; they have the glabrous panicle-branches and larger spikelets of *A. Reinwardtii* v. HALL.

HITCHCOCK mentions *Agrostis Reinwardtii* v. HALL in his paper on Papuan grasses collected by L. J. BRASS (Brittonia Vol. 2, 1936, p. 117) as common in forest glades on Mount Albert Edward in the Central Division (BRASS 4203). I did not see this plant which should be compared with BUSE's type material.

KUNTH described and figured two species of *Arundo* in the same year, *Arundo madagascariensis* KUNTH which is *Donax Thouarii* P. B. from Madagascar and *Arundo Reynaudiana* KUNTH from Pegu. HOOKER did not accept these two species, when he based his new genus *Neyraudia* on the former making the combination *Neyraudia madagascariensis* (KUNTH) HOOK. F. The genus and the species were extensively described by him in the Flora of British India, Vol. VII (1897) p. 305. There was, however, an earlier name for the species *Donax Thouarii,* given by BEAUVOIS. Since I found that *Aristida arundinacea* L. was congeneric with *Neyraudia* HOOK. F., the species bears the name *Neyraudia arundinacea* (L.) HENR., as given in my monograph of *Aristida.*

BUSE described in the year 1854 an *Arundo Zollingeri* from Java which was accepted by HOOKER as a variety of his *N. madagascariensis.* At the same time HOOKER gave *Arundo Reynaudiana* KUNTH as a synonym of this variety *Zollingeri.* Recently *Arundo Reynaudiana* KUNTH was accepted by KENG as a distinct species and he made for it the new combination *Neyraudia Reynaudiana* (KUNTH) KENG. If we agree with HOOKER's opinion that both names of KUNTH belong to but one species, we have to accept HOOKER's variety *Zollingeri* for KENG's *Neyraudia Reynaudiana*; HOOKER's variety, when transferred to *Neyraudia arundinacea* (L.) HENR., retains its name, as the citation of an earlier synonym (*Reynaudiana*) has no influence on the choice of the name of the variety, according to art. 48 of the international rules of nomenclature. Hence the plant so common in Java must bear the name **Neyraudia arundinacea** (L.) HENR. var. **Zollingeri** (BUSE) HENR. nov. comb.

One of the most puzzling groups of grasses concerns *Paspalum scrobiculatum* L. as it is accepted in BACKER's "Handboek". The description there is a mixture of at least 5 minor groups which must be accepted as distinct species. It is rather easy to recognize the *Paspalum longifolium* Roxb. by its small, pubescent, commonly 4-ranked spikelets, its many racemes on an elongate axis and its long leaves.

Another distinct species is the very broad-leaved, robust *Paspalum auriculatum* Presl. which occurs also in Africa and was sufficiently treated by Stapf in the Flora of Tropical Africa.

After the elimination of these two species, the remaining group is still a mixtum, but not so easy to disentangle. At first we must call attention to *Paspalum orbiculare* Forster, very shortly and insufficiently described in the year 1786 from the Society Islands. Not having seen the type of this species we are totally dependent on Hitchcock's treatment of this species in this Grasses of Hawaii (Mem. of Bishop Mus. VIII, No. 3, 1922, p. 179) where the species is more fully described and a plate is given. In the description the small, 2 mm long spikelets are characteristic. It is a pity that no figure of the spikelet is given by Hitchcock. Fortunately, I received a good specimen from him, collected by himself on the island of Oahu, from which I could recognize the species which is rather dispersed in the tropical Asiatic regions, although apparently much rarer than the wild form of *Paspalum scrobiculatum* L. In this specimen the small green spikelets are distinctly apiculate and not rounded at the summit, as is the case in *Paspalum scrobiculatum* L. and both glumes are 3-nerved. We are thus able to separate this species which occurs rather plentiful in the Lingga Archipelago. This very distinct species, as Stapf already indicated, was placed in Fluegge's Monograph (1810) under *Paspalum scrobiculatum* L., citing also Willdenow's description. From Fluegge's citations we do not know that he has seen an authentic specimen of Forster's species and Forster is not mentioned among the "Loci Natales" nor under the persons who communicated specimens to him. Therefore, it may be that Fluegge did not recognize the true *Paspalum orbiculare* Forst. as a distinct species. This is very probable, because Fluegge gave some "Observationes" after his description of *Paspalum scrobiculatum*. In Observatio IV (p. 93) he says "Clarissimus Willdenowius jam Paspalum orbiculare Forsteri singularem a Paspalo Kora diversam esse speciem censet: in quo equidem viro doctissimo non assentior, propterea quod nervorum in glumis calicinis numerus non magis quam pedicellorum natura in hac specie sibi constat. Variat haec planta omni parte mirum in modum, neque ullum fere exemplar alteri plane respondet, quod ex diversa loci natura enevire videtur."

Thus, although WILLDENOW recognized two species, FLUEGGE could not follow him and the reason is, in my opinion, that FLUEGGE did not recognize FORSTER's species which he identified as WILLDENOW's *Paspalum Kora* (which is most allied to the true *P. scrobiculatum*). He had probably a wrong specimen before him, and therefore described the true *Paspalum orbiculare* as a new species, when he received a specimen collected by FORSTER in New Caledonia and communicated to him by MEYER as *Paspalum undulatum*, under the name of *Paspalus Forsterianus* FLUEGGE. This new name is without doubt based on *Paspalum undulatum* SPRENGEL in Mantissa prima Fl. Halensis (1807) p. 30. E. nova Caledonia. Forst. He changed the name on account of the existing *Pasp. undulatum* POIRET (1804).

In his Observatio IV FLUEGGE added the following sentence: "Forsterus eam Paspali venusti nomine insignitam amicis mittebat, antequam descripserat." FLUEGGE mentioned for his *Pasp. Forsterianum* the "spiculae elliptico-lanceolatae, acutiusculae subtrifariam imbricatae", and the five-nerved glabrous glumes with the stramineous lemmata. In BALANSA's Herbarium I have seen specimens collected by him in New Caledonia with his note: "confer Pasp. Forsteriano Fluegge". This very good material agrees with HITCHCOCK's plants and has always 3-nerved glumes, in contradiction with FLUEGGE's statement.

For these reasons I accepted *Pasp. orbiculare* FORST. and *Pasp. Forsterianum* FLUEGGE as belonging to the same species, reasons which are, however, only based on the specimens at my disposal. In the group of the *Paspalum scrobiculatum* L. this *Paspalum orbiculare* FORST. is at once recognizable by the small, glabrous, acuminate, greenish, 3-nerved spikelets, which most agree with those of *Pasp. longifolium* ROXB. The remaining group after the elimination of this species has to bear a name and being much related to the type of *Paspalum scrobiculatum* L., many authors have assigned this name to it. Now, field studies have proved that specimens described by LINNÉ as *Paspalum scrobiculatum* do not occur in a wild state, and STAPF considers LINNÉ's plant as the cultivated form of the species *Paspalum scrobiculatum* in a broad sense. I think that it is better to accept these wild forms as a distinct species. It was already described by LAMARCK as *Paspalum Commersonii*, found by COMMERSON in Mauritius. I have seen an authentic specimen in BALANSA's fine collection labeled "Paspalum Commersonii (Ile de france) Commerson". STAPF accepts this species as a variety under *Paspalum scrobiculatum* L. in the Flora of Tropical Africa, with *Paspalum Kora* WILLD. as a synonym. As is already said by me, I prefer to take up this plant as a distinct species under LAMARCK's name. Its spikelets are much smaller than those of the type of LINNÉ and much larger than those of *Paspalum orbiculare*, brownish at maturity with dark brown lemmata, they are rounded and obtuse at their summit and the glumes are 5—7-nerved. The type of LINNÉ's *Paspalum scrobiculatum* is accepted by STAPF under the varietal name *frumentaceum*, a name which goes back to *Paspalum frumentaceum* ROTTB. ex ROEM. et SCH., Syst. II, 296.

There is still another species in this group, the *Paspalum cartilagineum* PRESL. It is characteristic by its lemma of the lower floret being cartilaginous instead of membranous. It is considered by American authors as a distinct species, but by others as a variety of *Paspalum scrobiculatum* L., sometimes also regarded as a monstrosity. The material at hand proves, however, that the form and outline of the spikelets is quite different in other species of the group of *Pasp. scrobiculatum* L. They are never so rounded, distinctly obovate and slightly broader above the middle and they are about 2 mm long. Studied in connection with the other species of this group, this species suggests a closer affinity to *Paspalum orbiculare* FORST., where the spikelets are oval, broadest at the middle and distinctly apiculate. On account of the affinity of the two species SUMMERHAYES and HUBBARD, in their study on the grasses of the Fiji Islands, have united them, placing PRESL's species as a variety under *Paspalum orbiculare* FORST.. The quite different form of the spikelets and the striking differences in the nervation of the glumes, given by me above are, however, to be regarded as important, if we study the genus *Paspalum*, as it is treated by Mrs. A. CHASE. For quite the same reasons as in other difficult groups of *Paspalum* in North and South America it is better to keep them separate.

Going over the whole material at hand, a discrimination is not very difficult, although there are always a few specimens which do not fit exactly in one of the groups accepted. It may be that there occur hybrids here between so much related species, which not rarely grow together in many localities. All factors considered, it seems better to recognize the various groups as distinct species and on the whole specimens may be segregated with relatively few intermediates. In this matter I fully agree with Mrs. A. CHASE, who recently divided the puzzling complex *Axonopus compressus P. B.* into two distinct species.

HITCHCOCK, who had a great skill in pointing out various good characters for discrimination of many troublesome groups, has more recently given a new idea for the wild forms of *Paspalum scrobiculatum*. He put it forward in ALSTON's treatment of the species in the Supplement to the Flora of Ceylon by Trimen. A key is given for the various species of *Paspalum* on p. 313. Besides the name *Paspalum scrobiculatum* L., restricted to the cultivated plant, we find there *Paspalum Commersonii* Lamk., *Paspalum longifolium* Roxb. and a new one named *P. Metzii* Steudel. *Paspalum longifolium* Roxb. is not characterized by the puberulous spikelets but by the spikelets in three or four rows, with numerous racemes and with a tuft a white hairs in their axils. We further learn from the description on p. 315 that the spikelets are glabrous. The two other species *P. Commersonii* and *P. Metzii* are distinguished by: styles white, racemes usually paired, inflorescence shortly pedunculate in *P. Metzii* and styles dark purple, racemes usually 3—4, inflorescences long pedunculate in *P. Commersonii.*

However, *Paspalum Metzii* Steud. is described on p. 314 as having spikes 1—4, usually 2. It seems to me that it is not easy, even rather impossible, to divide a large material on such grounds. The number of racemes is variable even in the same plant and from other characters of the inflorescence the same can be said. The colour of the stigmas, white versus dark purple, important in fresh material, cannot be checked in the various old types, nor in the other dried material. Alston says that *Paspalum Metzii* Steud. appears to be the wild form of *Paspalum scrobiculatum* rather than *P. Commersonii.* The identification of this species was given by Hitchcock. For the adoption of the name *Paspalum Metzii* Steud. there ought to be found better and more practical characters to separate it from the older *Paspalum Commersonii* Lamk. after a more careful examination of the types in the future, tested with abundant exsiccatae and living material.

It is noteworthy that in Roxburgh's description of *Paspalum longifolium* nothing is said about the pubescent spikelets which is in accordance with Alston's treatment; as this pubescence is sometimes rather scanty, it may be overlooked by Roxburgh, at the other hand we may not pretend that glabrous spikelets do not exist in *Paspalum longifolium.*

Various types of Roxburgh are only known from his drawings but we know that Trinius described species of Roxburgh in 1826. In his Dissertatio botanica altera, *Paspalum longifolium* Roxb. is described from a Javanese specimen received by Trinius from Nees. Trinius mentions the many alternate racemes (10—20), the foliaceous axis, broader than the spikelets and the 4-ranked mucronate, pubescent spikelets, all characters agreeing with the material from Java which was rather abundantly seen by me.

Recently Mrs. AGNES CHASE, in her article on the Papuan grasses, collected by L. J. BRASS II (Journal of the Arnold Arboretum, Vol. XX, 1939, p. 309), has given a new name *Panicum cruciabile* to the plant commonly known as *Panicum caesium* NEES, which was based in 1850 on CUMING 652 from the Philippines. This name, *Panicum caesium*, was already much earlier applied by him to a quite different species of the genus *Echinochloa* and is therefore to be rejected. *Panicum cruciabile* CHASE is indicated by CHASE as found in Ceylon, Burma, the Philippines and New Guinea. She overlooked that the species, with such a large distribution, was described already by BALANSA in 1890 as *Panicum cambogiense*. This species was taken up but not studied by Miss A. CAMUS in her treatment of the grasses of Indo China, because the plants of BALANSA were not represented in the Paris Herbarium. BALANSA's types are, however, in his own herbarium, which after his death came in the possession of the Rijksherbarium and these plants in BALANSA's script are, of course, the actual types so far as they are described by BALANSA himself. BALANSA's species is a large coarse grass, with pubescent nodes and strongly tuberculate-hispid sheaths, quite as in the specimens mentioned by Mrs. CHASE and is an annual plant too. It is allied to *Panicum luzonense* PRESL, a smaller, annual species with smaller spikelets. BALANSA's description is short but valid and is supported by his good material. The species which is also, although rarely, observed in Java, has to bear BALANSA's specific name. The very long branches of the very large panicles are characteristic for the species. The true *Panicum luzonense* PRESL was in BALANSA's hands, but described by him as a new species *Panicum oryzetorum* (l.c. p. 141). All the much shorter branches of the panicle have about the same length and they are reiterately branched, hence the form and outline of the panicle in *P. luzonense* is entirely different from that of *Panicum cambogiense* and the two species, although much allied, may be recognized at first sight.

Another plant mentioned by BALANSA is his *Panicum Munroanum*. It was given as a substitute for MUNRO's variety β, spiculis glabris of *Panicum Helopus* TRINIUS, published by THWAITES in his well-known Enumeratio plantarum Zeylaniae (1864). We have here the case that in reality *Panicum Munroanum* BALANSA is not effectively described. But BALANSA gave various data and proposed to accept MUNRO's variety as a distinct species and his name is a substitute for MUNRO's variety and therefore a valid name. *Panicum Munroanum* belongs, however, to the genus *Acroceras* and being the same as MERRILL's *Panicum crassiapiculatum*, it has to bear the epithet of BALANSA and thus becomes **Acroceras**

Munroanum (Balansa) Henr. nov. comb. All the specimens cited by Balansa were studied by me.

Acroceras is a small genus with about 8 species, 4 of them are enumerated in the Flora of Tropical Africa and one of them, *Acroceras zizanioides* (H. B. K.) Dandy is widely distributed in the New World from Argentina and Paraguay to Brazil and Guiana, going northward to the West Indian Islands and Mexico. The material of the New World is rather uniform and always characterized by its totally glabrous nodes. The material seen from Tropical Africa (Congo, French Sahara and Kamerun) agrees perfectly with the material of the New World and belongs to the same *Acroceras zizanioides*. *Panicum zizanioides* H. B. K. is also mentioned by Backer from Java. The Javanese material seen by me is, however, very distinct by its characteristically hairy nodes and the material seen from Soembawa and Banka is quite uniform as to this character. There are moreover many other differences in habit, leaf shape and in the spikelets. This Asiatic material represents a different species and in my opinion the true *Acroceras zizanioides* does not occur in our region. Backer's description is excellent as he mentions the hairy nodes.

This Asiatic species of *Acroceras* was not overlooked by Hackel, who named it *Panicum Ridleyi,* a name which is to be found in Hooker's Flora of British India with the indication "name only". Indeed, in the Trans. Linn. Soc. Ser. 2, Bot. III p. 401, this name is mentioned as a nomen nudum. Hackel distinguished the species, which was collected by Ridley near Pulau Besar in Malaya. Stapf, when he treated the genus in 1920 in the Flora of Tropical Africa (l.c. p. 623) copied the data from Hooker and mentioned Hackel's species as a nomen nudum too. Stapf overlooked however that the great agrostologist published his *Panicum Ridleyi* already in 1901 in Schmidt's Flora of Koh Chang, Part. III. This is a contribution to the knowledge of the vegetation in the Gulf of Siam and a preliminary Report on the botanical results of the Danish expedition to Siam (1899—1900). We find this publication in Botanisk Tidsskrift Vol. 24 (1901), where on p. 98, *Panicum Ridleyi* Hack. is more fully treated with a latin diagnosis, indicating the differences with *Panicum oryzoides* Sw., which is Hooker's *Panicum latifolium* but not that of Linnaeus. On account of an earlier *Panicum oryzoides* Arduino, we have to accept for Swartz's name *oryzoides* the name *zizanioides,* given by the authors of the Nova Genera. Hackel's description of *Panicum Ridleyi* perfectly applies to the Asiatic plants, hitherto confounded with the American species and the former ones have to bear Hackel's name; we are inclined to accept for them the name *Acroceras Ridleyi* Stapf based on *Panicum Ridleyi* Hack.

The species, described by HOOKER as *Panicum latifolium* is as to the characters given by him, a mixture of HACKEL's species and another one, described by MERRILL as *Panicum crassiapiculatum,* a much more common species with a larger distribution, being known from Ceylon and British India, extending westward to Indo China and the Philippines. It occurs also in Java. We therefore have in our region two species of *Acroceras*; they differ not only in the characters of the spikelets but they are already recognizable in the vegetative parts.

The study of the various species of this small genus is hampered by the many contradictions found in the various treatments of the species in our manuals. Even HACKEL, when he diagnosed his *Panicum Ridleyi,* mentioned for the allied species a wrong character. He indicated that the lower glume is half as long as the spikelet in *P. oryzoides* Sw. (our *zizanioides* of the New World). HITCHCOCK and CHASE described and figured *Panicum zizanioides* in their well-known work: "The North American Species of Panicum" in Contributions from the U. S. National Herb. Vol. XV (1910) p. 326. We find here a lower glume about two-thirds the length of the spikelet, quite in accordance with fig. 367 and with the large material I could verify. From HACKEL's description we may accept that *P. Ridleyi* has a lower glume $^2/_3$ or $^3/_4$ the length of the spikelet. This is also mentioned by RIDLEY (Flora of the Malay Peninsula, Vol. V, 1925, p. 230), but his description of *A. Ridleyi* and his plate agree with *A. Munroanum.* For *A. Ridleyi* he gives as the type "Pahang River". But HACKEL indicates as his type "Pulau Besar" which is according to him the same as a specimen from Koh Chang in Siam. This specimen from Pulau Besar is now placed by RIDLEY (or STAPF?) under a new species *Acroceras sparsum* STAPF ap. RIDLEY l. c. p. 229, which is a tall scandent (not dwarf and prostrate) grass with spreading panicles up to 14 in. long with up to 6 in. long distant scabrid branches, longer spikelets (ca 3 mm) and lower glume half as long as the spikelet. We do not learn what is the type of this *Acroceras sparsum* STAPF, given with so many localities, but according to RIDLEY it is his *Panicum oryzoides* RIDL. Mat. III, 138 (not of Sw.). Nothing is said by RIDLEY about the fine character of the hairy nodes.

From all the data in RIDLEY's descriptions at hand we learn that the dwarf prostrate grass with 6 in. tall stems, lanceolate leaves 5 cm long and 6—7 mm wide, short, up to 5 cm long panicles with a few short, not spreading branches each with about 4 spikelets and with glume I more than half as long as III, is the same as *A. Munroanum.* This is also evident from fig. 223.

How to explain the differences between HACKEL's description and type with RIDLEY's description? This is rather clear from HACKEL's own statements. HACKEL, after having given a latin diagnosis, tells us that the species was established by him on specimens received from RIDLEY and collected by him near Pulau Besar in Malacca. HACKEL says that these specimens are identical with the plants collected near Koh Chang in Siam. These plants are certainly in HACKEL's own herbarium at Vienna. HACKEL further says, that afterwards RIDLEY communicated to him also specimens from Pekan, which he determined as forma minor of *Panicum Ridleyi*. HACKEL says of this Pekan plants: "I see at the moment however that they better belong to P. latifolium, they belong to the, in India diffused, form of this species, which is perhaps to split as a variety". This forma minor from Pekan is now placed by RIDLEY under *Acroceras Ridleyi* STAPF, although HACKEL exactly indicated that it is not his *Panicum Ridleyi*. The conclusions are therefore that RIDLEY communicated to HACKEL various plants of the genus *Acroceras*, but RIDLEY did not receive them back, but wrote HACKEL's names, communicated to him by letter, on the labels of the duplicates he had at hand. RIDLEY did not control HACKEL's statements of 1901, because he cited only HACKEL in Trans. Linn. Soc. p. 400, where the name is a nomen nudum. RIDLEY now gave HACKEL's names to the wrong specimens and these were sent to Kew, where STAPF without verifying HACKEL's statements of 1901 too, accepted the determinations as correct. STAPF gave the manuscript names *Acroceras sparsum* STAPF and *A. Ridleyi* STAPF; the latter is, properly speaking, based on the nomen nudum *Panicum Ridleyi* HACK. in the Transactions. STAPF nor RIDLEY were acquainted with HACKEL's description and treatment afterwards given in 1901 and therefore RIDLEY is responsible for the difficulties which have arisen if the two species mentioned in his flora are to be recognized. It is a fact that STAPF's *Acroceras Ridleyi* is based on a nomen nudum and not on the description which was unknown to STAPF. *A. Ridleyi* STAPF is therefore without any doubt a synonym of *Panicum crassiapiculatum* MERR. (our *Acroceras Munroanum*) and *Acroceras sparsum* STAPF ap. RIDLEY is HACKEL's true *Panicum Ridleyi* as described in 1901. Both names are in this case misleading. There are now two conclusions. *Acroceras Ridleyi* STAPF is based on a nomen nudum and described and figured in RIDLEY's Flora. The description and plate apply to an already described species. Hence *Acroceras Ridleyi* STAPF is a synonym.

Second conclusion: the true *Panicum Ridleyi* as described by HACKEL himself in 1901 cannot bear the name *Acroceras Ridleyi* on account of the existing name by STAPF for a quite different species. Hence it has to bear another name. *Acroceras sparsum* STAPF may therefore be accepted for this species because the description points to the species which HACKEL published as *Panicum Ridleyi* in 1901. HACKEL's type is moreover mentioned by STAPF under the localities. In this description nothing is said about the hairy nodes of the true *Panicum Ridleyi,* but we find among RIDLEY's plants also Perak, Goping, a plant cited by HOOKER as var. *major* of his *Panicum latifolium.* This plant is mentioned by HOOKER as having a stout, 4—6 ft high stem, rigid internodes, tomentose nodes and leaves $^3/_4$ inch broad, margins thickened, base narrowed, panicle nearly 12 in. long: Malay Peninsula, at Goping, KING's collector. All these data agree perfectly with HACKEL's description of *Panicum Ridleyi.*

All these observations give us the following synonymy of the two Javanese species of *Acroceras.*

Acroceras Munroanum (BALANSA) HENR. = *Panicum Munroanum* BALANSA (1890) = *Acroceras crassiapiculatum* (MERR.) ALSTON (1931) = *Panicum crassiapiculatum* MERR. (1906) = *Acroceras Ridleyi* STAPF ap. RIDLEY (1925), non *Panicum Ridleyi* HACKEL (1901).

Acroceras sparsum STAPF ap. RIDLEY (1925) = *Panicum Ridleyi* HACKEL (1901) non *Acroceras Ridleyi* STAPF ap. RIDLEY (1925).

It is noteworthy that ALSTON in the Supplement of the Hand-book to the Flora of Ceylon by Trimen, Part. VI. (1931) p. 324, arrives at the same conclusions, as he placed *Acroceras Ridleyi* STAPF ap. RIDLEY as a synonym under his *Acroceras crassiapiculatum,* quoting RIDLEY's Fl. Mal. Pen. V. (1925) p. 229.

So we have here the curious fact that STAPF and RIDLEY, by applying a name to the wrong plants, overlooking a valid description and working only with a nomen nudum, are responsible for the elimination of a validly published species by HACKEL, the more so because at the same time they transferred the name to another genus. If STAPF and RIDLEY had published the combination in the Flora of Malaya, as it was given by HACKEL, the overlooked description of HACKEL, given earlier, had been valid, and this fact recognized we would have been able to make a valid combination under *Acroceras* with HACKEL's specific name. The discovery that both STAPF and RIDLEY were unacquainted with HACKEL's valid description and dealt only with an earlier nomen nudum, brought the nomenclature of the Javanese species in a quite different position and gave rise to the disappearance of a valid name proposed by its author.

From the above-mentioned facts I wish not to pretend that the true *Acroceras zizanioides* (H. B. K.) DANDY does not occur on the Asiatic continent, although it is not yet found in one of the islands of the Malay Archipelago. In BALANSA's herbarium I saw this true *A. zizanioides* from Tonkin, where it was collected near Tu Phap, in 1887 (BALANSA no. 1643). This is very good material, perfectly agreeing with the American plants. The same species was also found in GRIFFITH's herbarium (distributed at the Royal Botanic Gardens, Kew (GRIFFITH no. 6517). Here the species was mixed with *Acroceras Munroanum*. This species therefore seems to be rather rare, as these two plants are the only ones seen from the Asiatic continent.

Miss CAMUS has confounded two species of *Acroceras* in the Flore générale de l'Indo-Chine (p. 423—424), as appears from her description, the synonymy and the cited material. We know at present how distinct *Acroceras Munroanum* and *A. zizanioides* are.

Recently the genus *Acroceras* was also collected in Borneo on Mount Kinabalu by CLEMENS (no. 29694) and distributed as *P. zizanioides* H. B. K. The material seen by me agrees, however, perfectly with other plants from Java, Sumatra and Soembawa and therefore belongs to *Acroceras sparsum* STAPF.

In the course of the investigations in this very interesting little genus of grasses there are two other species, which are noteworthy. There occurs in South America a very curious and striking grass, which was described as *Panicum paucispicatum* MORONG. It was already treated by me, when I studied the grasses from Bolivia in HERZOG's collection and HITCHCOCK and CHASE indicated it as closely related to *Panicum zizanioides* H. B. K. This *Panicum paucispicatum* is distinguished by the pubescent spikelets with a more pronounced crest to the fertile lemma. This easily recognizable species is here transferred to the genus *Acroceras* as **Acroceras paucispicatum** (MORONG) HENR. nov. comb., based on *Panicum paucispicatum* MORONG. This beautiful species was seen by me from Argentina (PARODI no. 8471); Bolivia (HERZOG no. 1524) and Paraguay (BALANSA no. 35, FIEBRIG no. 632). The species has finely pubescent nodes and very characteristic leaves, pectinately ciliate along the much thickened margins.

We have now dealt with seven species and the eighth one is a somewhat aberrant one. Being described by BALANSA as *Panicum tonkinense* it was placed by Miss CAMUS in a new genus *Neohusnotia* in the year

1920. *Acroceras* STAPF is from the same year, but has priority by several months. I had at my disposal the exceedingly good and rich complete material of BALANSA's *Panicum tonkinense* and although I agree with Miss CAMUS in accepting BALANSA's species, I must confess that already at first sight it proved to be a member of the genus *Acroceras*. Let us first of all compare the vegetative parts. A coarse grass with hairy nodes, broad lanceolate blades with much thickened margins, the rounded base with hairs on tubercles, long effuse panicles, with long distant spreading branches. All these characters agree perfectly with the material seen from Borneo, Java, Sumatra and Soembawa, cited by me above and accepted as *Acroceras sparsum* STAPF. Now we must verify the characters of the spikelets, upon which the genus *Neohusnotia* is differentiated. In form and outline these spikelets agree with those of *Acroceras*, especially with *A. zizanioides* and *A. sparsum*.

Miss CAMUS treated the differences between the genera *Acroceras* and *Neohusnotia* in her Key in the Flore générale de l'Indo-Chine (l. c. p. 211) as follows: Inflorescence formée d'épis souvent penchés, ni en panicule lâche, ni en panicule contractée en un seul épi: épillets ordinairement disposés sur un rachis dorsi-ventral. *Acroceras* is placed in this group next to *Paspalidium, Urochloa, Brachiaria, Echinochloa* etc. The other group is characterized by: Inflorescence en panicule lâche ou contractée en un seul épi cylindrique; rachis ordinairement non dorsiventral. *Neohusnotia* is placed in this group next to *Panicum, Sacciolepis, Cyrtococcum* and *Hemigymnia* (= *Ottochloa*).

From this discrimination it is evident that Miss CAMUS had an incorrect idea of the structure of the panicle in the genus *Acroceras*; its type being the American *Panicum zizanioides* H. B. K. It may be that American material was not studied by her and that she formed her ideas of the panicle in *Acroceras* from *Panicum Munroanum* or from *Panicum crassiapiculatum*, both cited by her. Moreover material of BALANSA and MERRILL was certainly at her disposal. We know that this *Panicum Munroanum* agrees rather well in the characters of the inflorescences with such genera as *Brachiaria, Urochloa* and *Paspalidium*, whereas *P. zizanioides* in its inflorescence is more deviating. It is, from all the facts hitherto known, absolutely impossible to find in CAMUS's key a single character to separate the genera *Acroceras* and *Neohusnotia*.

Let us now look at the various characters Miss CAMUS gave to both genera. *Acroceras* is characterized by her as follows: "Épillets à pointes courtes, obtuses, calleuses, comprimées latéralement", *Neohusnotia* as "glume 2 et glumelle 1 de la fl. inf. brièvement laineuses au sommet, à appendice court, obtus, aplati latéralement, peu dur; gl. 1 très longue; glumelle 1 de la fl. inf. assez dure.“ Between these two distinctions there is not a single character that points to two different genera, the shortly hairy summits of gl. 2 and 3 are characteristic but still more hairy spikelets are present in the South American *Acroceras paucispicatum.* Both *Acroceras* and *Neohusnotia* have a very distinct laterally compressed crest of the fertile lemma, hence the name *Acroceras* of Stapf's genus. The only difference between the two genera is in my opinion that the sterile lemma (gl. III) is more cartilaginous in *Neohusnotia* and more papery in *Acroceras.* This, however, cannot be accepted as a generic character. A quite analogous case is *Paspalum cartilagineum* Presl versus other allied species of *Paspalum.* Here the second glume and often also the sterile lemma have nearly the same texture as the fertile lemma. This case is quite parallel to *Neohusnotia.*

Balansa's description of *Panicum tonkinense* agrees with his material, the types in his script being preserved in his own herbarium at the Rijksherbarium. Miss Camus's description of *Neohusnotia* is also very good, although there is some difference in the length of the lower glume, as is the case in other members of the genus *Acroceras.* After the study of Balansa's rich material it was impossible to separate it from the genus *Acroceras* and therefore it is accepted as a member of that genus under the name of **Acroceras tonkinense** (Balansa) Henr. nov. comb. based on *Panicum tonkinense* Balansa.

After all the data given above it may appear that this *Acroceras tonkinense* is the same as *Acroceras sparsum* Stapf, at least as far as the material from Java, Sumatra, Borneo and Soembawa as seen by me is concerned. This material has spikelets also shortly pubescent upwards, the same more or less indurated sterile lemma, the same form of the spikelets, moreover the same pubescent nodes and the dark blades with the strongly thickened margins with their auriculate undulate base with its hyaline hairs. If indeed both species ought to be united, the name *Acroceras tonkinense,* having priority, is to be accepted for the Javanese species. Ridley's description of *Acroceras sparsum* is very insufficient, as nothing is said about the nodes and the various characters of the spikelets. Material from Malaya was not available and we must therefore wait until this can be studied more in detail so as to disentangle the case.

Miss Camus noted that her new genus was intermediate between *Lasiacis* and *Acroceras.* The former is a distinct American genus with a curious woolly tuft at the summit of the fertile lemma, moreover with a bamboo-like habit. The vegetative parts of the genus *Neohusnotia*, however, are quite the same as in the genus *Acroceras*.

In the New World there occurs a species of *Oryzopsis*, which was described as *Oryzopsis Seleri* PILGER from Guatamala and which is allied to the North American *Oryzopsis fimbriata*. Both belong, as to the important character of the rigid palea with two much approximate keels and a narrow sulcus between them, to the genus *Piptochaetium*. *Oryzopsis fimbriata* was already transferred to it by HITCHCOCK. The other species mentioned, has to bear the combination **Piptochaetium Seleri** (PILGER) HENR. nov. comb., based on *Oryzopsis Seleri* PILGER.

In HACKEL's famous monograph of the *Andropogoneae* the great agrostologist accepted for a large genus the name of *Pollinia* TRINIUS, although he was acquainted with the fact that there was an earlier name *Pollinia* by SPRENGEL, which belongs to the genus *Andropogon*. According to our present rules of nomenclature the genus *Pollinia* TRINIUS is to be considered as invalid and now substituted by KUNTH's name *Eulalia* from 1829. It was OTTO KUNTZE who already transferred a great many species of HACKEL's genus *Pollinia* to *Eulalia*. HACKEL had in his work two large subgenera; for the first one he accepted *Eulalia* of KUNTH and for the other one the name *Leptatherum* NEES, described in 1841 as a genus in Proc. Linn. Soc. I. p. 92, with *Leptatherum Royleanum* NEES as the only species. Such a generic description, including the description of the only species mentioned, is, as we know, valid according to the rules of nomenclature. The same genus was described as *Microstegium* NEES ap. STEUDEL in his Synopsis (1854), moreover also as *Nemastachys* STEUDEL in the same Synopsis, earlier on p. 357 from Taiti. Without further investigations, one is inclined to accept the name *Leptatherum* NEES as being the earliest one, if we study only the data given in HACKEL's monograph. ROBIJNS used this name for the only species which occurs in the region of the Belgian Congo; cf. Flore Agrostologique du Congo Belge I (1929) p. 88—89, where *Eulalia* and *Leptatherum* are diagnosed. It appeared, however, that the genus *Microstegium* was already described in 1836, but it was incorrectly cited in the Kew Index and recently also by HITCHCOCK in his grasses of Canton and vicinity (Lingnan Science Journal Vol. 7, March 1931, p. 234).

The citation in both is *Microstegium* NEES ap. LINDLEY Intr. Bot. ed. 2. 1836. Such a second edition does not seem to exist. There is, however, a book of LINDLEY entitled: A natural system of Botany or a systematic view of the whole vegetabile Kingdom (1836). This is certainly the book HITCHCOCK meant. *Microstegium* NEES was described there as a genus with *M. Willdenovianus* NEES as the type (Nepal in Herb. WILLD.). This is the correct date of the genus *Microstegium*, and the earliest one. Miss CAMUS accepted this name, making in the "Flore générale de l'Indo-Chine" various new combinations for the species represented within that region. The tendency to establish smaller genera, which are sharper limited, is a method, more and more accepted in modern times; accepting this method we have, however, to take the priority into account. Thus the only species from the Congo is **Microstegium Bequaerti** (DE WILLDEM.) HENR. nov. comb., based on *Pollinia* or *Eulalia Bequaerti* DE WILLDEM., only known from Katanga.

Both genera *Eulalia* and *Microstegium* are found in Java. *Eulalia* is represented there by 4 species, *Eulalia contorta* (BRONGN.) O. K., *Eulalia quadrinervis* (HACK.) O. K., *Eulalia fimbriata* (HACK.) O. K. and *Eulalia argentea* BRONGN., which was described in 1830. The synonymy of the latter is somewhat entangled and there is an earlier valid name for the species. ROXBURGH described the same species in 1820 as *Andropogon tristachyus*, an invalid name because there was already an *Andropogon tristachyus* H. B. K. from 1816. SCHULTES recognized this and renamed ROXBURGH's species into *Andropogon trispicatus* in Mantissa II (1824) p. 452. Hence the valid name for this species becomes **Eulalia trispicata** (SCHULTES) HENR. nov. comb.

A species of *Pollinia*, found in New Guinea, belongs to the genus *Eulalia*, its name is **Eulalia leptostachys** (PILGER) HENR. nov. comb. based on *Pollinia leptostachys* PILGER in ENGLER, Bot. Jahrb. Bd. 52 (1914) p. 170.

Let us now pass to the genus *Microstegium*. For Java we have at first **Microstegium dispar** (STEUD.) HENR. nov. comb., which is based on *Pollinia dispar* STEUDEL. *Pollinia geminata* MERR. is the same species. Another species is **Microstegium nudum** (TRIN.) CAMUS. BACKER described from Java a *Pollinia clavigera*, for which I propose the combination **Microstegium clavigerum** (BACK.) HENR. nov. comb.

Various species, treated in HACKEL's monograph, were united by BACKER in his "Handboek" under the name of *Pollinia ciliata* TRINIUS (sensu valde ampliato). I wish to accept this name only for the species as it was accepted by its author, in which case it must bear the combination *Microstegium ciliatum* (TRIN.) CAMUS, which is based on *Pollinia ciliata* TRINIUS from 1833. It is very probable that this species is the same as *Andropogon fasciculatum* L., Sp. Pl. ed. 1, p. 1047, for which the combination **Microstegium fasciculatum** (L.) HENR. is to be given.

We know that THELLUNG accepted *Andropogon fasciculatum* L. as a *Chloris* and based upon this name his *Chloris fasciculata* (L.) THELL., a name, invalid on account of the existing *Chloris fasciculata* SCHRAD. in SCHULTES Mantissa II (1824) p. 339, which is *Chloris distichophylla* LAGASCA (1816); cf. THELLUNG's article in FEDDE, Repertorium X (1912) p. 289. HITCHOOCK pointed already to the incorrectness of THELLUNG's combination, but also to the fact that the species described by LINNAEUS, certainly did not belong to the genus *Chloris*. LINNAEUS gave a description of his own and two references. The second reference from SLOANE is followed by a question-mark, showing that it was a doubtful synonym. It is certainly not the basis of LINNÉ's name, therefore it has to be eliminated. The first reference to MORISON refers to a plant from India with villous spikes and has to be eliminated too, because LINNÉ's description expressly states that the spikes are glabrous. Hence we have only to do with LINNÉ's own description in connection with his type specimen.

MUNRO stated that there are two specimens marked *Andropogon fasciculatum* L. in the Linnaean herbarium. One is *Eleusine indica* (L.) GAERTN., described by LINNÉ himself and the other is *Pollinia ciliata* TRIN. To the latter, LINNÉ's description points with certainty, even the "flosculis utrinque aristatis"; *Pollinia ciliata* has awns 2—5 times longer than the spikelets, a shortly ciliate axis of the racemes and glabrous spikelets, pectinately ciliate only along the keels of the lower glume. LINNÉ's description therefore, perfectly agreeing with the specimen in his herbarium, is to be accepted as valid and to be applied to the specimen of *Pollinia*. I therefore accepted this combination under *Microstegium*. We know from HACKEL's monograph that this author pointed out this question quite sufficiently in his work on p. 177 under *Pollinia ciliata* TRIN. and we quite agree with HITCHOOCK's treatment of this question in FEDDE, Rep. X (1912) p. 461.

At the same time I accept as distinct, some other species, notwithstanding BACKER's statement that they are not separatable by sharp characters and that they are connected, as he says, by many intermediate forms. The intermediate forms (accepted that they occur in reality) do not invalidate the standing of various allied species. In the modern school of taxonomy, under the influence of British systematic botanists, we feel more and more inclined to limit the species more sharply and small characters, not always at once to understand, are often of great importance for the identification and the delimitation of allied species. I therefore do not agree with BACKER's opinion to accept his *Pollinia ciliata* in such an amplified sense as is given in his Handboek.

I accept the following species:

Microstegium eucnemis (NEES) HENR. nov. comb. based on *Pollinia eucnemis* NEES ap. STEUDEL.

Microstegium Stapfii (HOOK. F.) HENR. nov. comb. based on *Pollinia Stapfii* HOOK. F. (1897).

Microstegium rufispicum (STEUD.) HENR. nov. comb. based on *Andropogon rufispica* STEUD. in ZOLL., Syst. Verz. p. 59. nom. nud. Synops. p. 379. (descriptio). Endemic in Java.

Microstegium vagans (NEES) HENR. nov. comb. based on *Pollinia vagans* NEES ap. STEUDEL Synops. p. 410.

Another species was collected in Java by JUNGHUHN and described by STEUDEL as *Pollinia montana* in 1854. HACKEL described it as *Pollinia grata* and this name was transferred to *Microstegium gratum* (HACK.) CAMUS. Being a plant from Java it has to bear its earlier epithet and becomes **Microstegium montanum** (NEES) HENR. nov. comb. based on *Pollinia montana* NEES ap. STEUDEL.

Microstegium delicatulum (HOOK. F.) HENR. nov. comb., based on *Pollinia delicatula* HOOK. F. (1897).

For *Polytrias,* a monotypic genus (spiculis ternatis, racemis solitariis) the name of the only species is given in the Index Kewensis as *Pollinia praemorsa* NEES ex STEUDEL Synops. p. 409. BUSE's name *Andropogon amaurus* given in the same year has priority, being already published in Febr. 1854. Hence OTTO KUNTZE named the species *Polytrias amaura* (BUSE) O. K.. Under this name the species occurs in BACKER's "Handboek". HACKEL named the species *Polytrias praemorsa* (NEES) HACK. and based his species on NEES's name found in STEUDEL's Synopsis. But NEES described his *Pollinia praemorsa* already in 1850 in an article: Gramineae Herbarii Lindleyani, published in HOOKER's Journal of Botany and Kew Garden Miscellany Vol. II, p. 98. NEES's name given in the year 1850 has thus priority above all other names hitherto known for this species and HACKEL's combination is therefore the valid one. Recently STAPF placed this species in the genus *Eulalia* as *Eulalia praemorsa* (NEES) STAPF ap. Ridley Fl. Mal. Penins. *Andropogon diversiflorus* STEUDEL ap. ZOLLINGER Syst. Verz. p. 58 is a nomen nudum, this name was afterwards validly published by STEUDEL in 1854 in his Synopsis. STEUDEL did not see NEES's *Pollinia praemorsa* also taken up by him in 1854 p. 409. On p. 370 of the same Synopsis STEUDEL described the same species under two different names *A. firmandus* and *A. diversiflorus.*

Another genus from the Javanese flora was formerly taken up by NASH as *Amphilopsis*, but has to bear the earlier name of *Bothriochloa* O. K. Besides *Bothriochloa pertusa* (L.) CAMUS and the so-called *Bothriochloa intermedia* (R. BR.) CAMUS there occurs in Java an endemic species described by BACKER as *Andropogon modestus*. For this species the name **Bothriochloa modesta** (BACK.) BACK. et HENR. nov. comb. is proposed.

As to the species *Bothriochloa intermedia* (R. BR.) CAMUS, given by BACKER in his "Handboek" as *Andropogon intermedius* R. BR., I have some objections against the name of this grass. ROBERT BROWN described his *Andropogon intermedius* from Australia. This true *A. intermedius* is a much coarser grass with spikelets 4 mm long, always unpitted glumes and an inflorescence with a short main axis, the lower racemes much exceeding it in length, so that the form of the inflorescence more resembles that of the *Bothriochloa pertusa* (L.) CAMUS, the well-known *Andropogon pertusus* (L.) WILLD. In the Javanese plants, commonly called *Andropogon intermedius*, there is a long main axis to the inflorescence, not rarely up to 20 cm long, the great number of racemes are shorter and the lower ones never overtop the axis. The spikelets are only 3—3½ mm long and pitted or unpitted. These characters correspond to a species, different from the true *Andropogon intermedius* R. BR.; they agree, however, with the characters of *Andropogon glaber* ROXB. (1820) as figured by TRINIUS in his Icones, t. 328 sub *Andropogon punctatus* TRIN. non ROXB. The correct name for the Javanese grass is therefore **Bothriochloa glabra** (ROXB.) CAMUS. In ROXBURGH's species the sessile spikelets are pitted, at the same time the pedicelled spikelets may be unpitted or pitted too. The status with unpitted sessile spikelets was described by PRESL as *Andropogon Haenkei*, but it has lower glumes often slightly depressed at the middle but not with a distinct nectariferous pit. This species of PRESL may be accepted as **Bothriochloa glabra** (ROXB.) CAMUS subsp. **Haenkei** (PRESL) HENR. nov. comb.

In the Caucasus there occurs an allied species of *Bothriochloa* with always unpitted sessile spikelets and a much shorter glume III (half as long only as I). It is accepted as **Bothriochloa caucasica** (TRIN.) HENR. nov. comb. based on *Andropogon caucasicus* TRIN.

Other species of this genus are:

Bothriochloa compressa (HOOK. F.) HENR. nov. comb. based on *Andropogon compressus* HOOK. F.

Bothriochloa Kuntzeana (HACK.) HENR. nov. comb. based on *Andropogon Kuntzeanus* HACK.

Bothriochloa ensiformis (HOOK. F.) HENR. nov. comb. based on *Andropogon ensiformis* HOOK. F.

Bothriochloa concanensis (HOOK. F.) HENR. nov. comb. based on *Andropogon concanensis* HOOK. F.

Bothriochloa Ischaemum (L.) HENR. nov. comb. based on *Andropogon Ischaemum* L.

Bothriochloa Foulkesii (HOOK. F.) HENR. nov. comb., based on *Andropogon Foulkesii* HOOK. F.

Bothriochloa pseudischaemum (NEES) HENR., nov. comb., based on *Andropogon pseudischaemum* NEES ap. STEUD. Synops. p. 380.

Easily recognizable as the genus *Capillipedium* STAPF is, so difficult it is to limit the various species of this genus. Rather common in Java is *Capillipedium parviflorum* (R. BR.) STAPF based on *Holcus parviflorus* R. BR. from Australia. This species has hairy nodes but glabrous internodes and occurs in two different forms, one of which may be accepted as the typical *Capillipedium parviflorum*. It has long branches to the effuse panicle, each branch with 3—5 spikelets, mostly a single triad of spikelets, consisting of one sessile and two pedicelled spikelets or with an accompanying group of 2 spikelets below it. In this plant the branches and branchlets are very slender and pilose in the axils, but otherwise glabrous. STEUDEL described an *Andropogon cinctus* in 1854. This is a *Capillipedium*, accepted by BENTHAM and by HACKEL as belonging to the species we are treating here. BENTHAM named it *Chrysopogon parviflorus* var. *spicigerus* in the Flora Australiensis VII (1878) p. 538 and HACKEL named it *Andropogon micranthus spicigerus* (BENTH.) HACK. in the monograph (1889) p. 489. This is a form, differing in having racemes with more than 5 spikelets, mostly there are 3 to 6 pairs, so that the aspect of the panicle is more dense. The internodes of the rhachis are here like the pedicels, ciliate, not glabrous as in the typical plant. I accept this subspecies as **Capillipedium parviflorum** (R. BR.) STAPF subsp. **capilliflorum** (STEUD.) HENR. based on *Andropogon capilliflorus* STEUD. Synops. (1854) p. 397.

This plant was already mentioned by ZOLLINGER as *Andropogon capilliflorus* STEUD. Herb. Zoll. 564; in arenosis M. Tengger 7500′ XI, in his Systematisches Verzeichniss Heft 1 (1854), p. 58. It is, however, a nomen nudum. The first description was by STEUDEL in his Synopsis, the beautiful types from Japan in SIEBOLD's collection are at the Rijksherbarium. Years ago they were at his request submitted to Dr. STAPF, who determined them as *Capillipedium parviflorum capilliflorum.*

HITCHCOCK in his "Grasses of Canton and Vicinity", placed this plant under *Andropogon micranthus spicigerus* (BENTH.) HACK. citing HACK. Monogr. (1889), p. 489. This is therefore not another rank of this form and accepting it as a subspecies I could give it its earlier name *capilliflorum*.

Another interesting *Capillipedium* is *Andropogon Hugelii* HACK. STAPF has transferred it in his treatment of the genus *Capillipedium*, in HOOKER's Icones 1922. I noticed, however, that the combination was already given by Miss CAMUS in "Les Andropogonées odorantes des régions tropicales". This study appeared in Revue de Bot. appl. et d'Agricult. col. Vol. I, No. 4 and was issued on 30 December, 1921. The combination was cited on p. 306 as *C. Hugelii* (*Androp. Hugelii* HACK.) d'Asie. Hence the correct name of this plant is **Capillipedium Hugelii** (HACK.) CAMUS.

I noted formerly in the collections at my disposal a very curious and much deviating species of *Capillipedium* from Timor, collected by FORBES. The same species occurs also in Java. It is a much more robust and coarse plant with very characteristic internodes. All the internodes bear a very hirsute coat, consisting of long irregular hairs like a wig. The internodes of the genus *Capillipedium* may be in some cases quite glabrous or have sometimes below the nodes only, a short appressed, rather scanty pubescence, but here the internodes are densely clothed all over, so that I give this species the name of

Capillipedium arachnoideum HENR. nov. spec. Perenne, caespitosum, stricte erectum. Culmi robusti, simplices, multinodes, elati, plus quam 1 m alti, basi squamis villosis praediti, inferne ad 3 mm crassi, teretes, nodis dense lanato- vel stellato-barbatis, internodia omnia longe crispe villosa; vaginae arctae, subcompressae vel leviter carinatae, praesertim intus rubentes, internodiis breviores, multisulcatae, inter sulcis coloratis pilis longis patentibus, basi tuberculatis praeditae, ad margines praesertim ciliatae; laminae anguste lineares, ad 5 mm latae, valde elongatae, sensim angustatae et apice longe setaceo-acuminatae, nervis prominentibus, nervo medio valido, albo, valde prominulo; ligula abbreviata, ciliata, auriculae lanosae; panicula ad 20 cm longa, subcontracta, 2—3 cm lata, haud densa, basi vagina inclusa, axis communis teres, puberulus et pilis longis crebris praeditus; rami verticillati, in axillis pilosi, inaequilongi, subramosi vel simplices, teretes, capillares, glaberrimi, ramulis brevissimis, 3-spiculatis, spiculis subimbricatis, pedicellis apice patellatis; spicula sessilis hermaphrodita, spiculae pedicellatae masculinae vel neutrae, duae, pedicelli applanati, dorso sulco longitudinali profundo exarati, in sulco membranacei diaphani, vix 2½ mm longi, marginibus haud ciliatis, laevibus; spicula hermaphrodita 3½ mm longa, callo breviter barbato, viridula vel rubella, dorso plana, toto breviter sparse puberula, gluma Ima ad carinas leviter ciliolata, apice angustata sed truncatula, IIda primam aequans, IVa aristata, arista perfecta, 16 mm longa, columna brunnea hirtula, subulam flavam aequante; spiculae pedicellatae sessiles aequantes, magis acuminatae haud truncatae, vix ciliatae, haud aristatae.

Java: Residentia Banjoewangi. Idjèn, Sading, prope Asem Bagoes, alt. 100 m 2. III. 1922 leg. V. M. A. Beguin no. 184. Typus speciei in Herb. Lugd. Bat. sub no. 924. 11—680.

To this species belongs also a plant collected by H. O. Forbes (1882—1883) in Timor (no. 3463). Herb. Lugd. Bat. sub no. 908.83—1284. It is a somewhat less coarse plant with slightly smaller spikelets but agrees otherwise perfectly with the beautiful type specimen. In the genus *Capillipedium* this very characteristic species with its very striking indumentum of the internodes, is most allied as to the floral characters, to *Capillipedium parviflorum* (R. Br.) Stapf and has the same triads of spikelets as in the typical form of the latter.

The same species occurs also in the Philippines; the specimens at hand were issued by the Bureau of Science as *Andropogon micranthus* Kth., but the number 40508 is not mentioned in Merrill's "An enumeration of Philippine flowering plants", Vol. I (1925). This number agrees with the new species, described above, in the villous internodes of the culms and in the form of the panicle, but it is a considerably less robust plant, with the habit of *Capillipedium parviflorum*, it is moreover distinguished by triads of spikelets with a second pair below them, the racemes have thus commonly two hermaphrodite spikelets and hence consist of 5 spikelets. There are, however, in the panicles also triads as found in the typical *C. parviflorum*. This form of the new species is quite analogous to the one observed in *C. parviflorum* and mentioned by me already as subsp. *capilliflorum*, and proves that plants with more than three spikelets per raceme, cannot be accepted as a distinct species.

Merrill mentions *Andropogon micranthus* Kunth var. *spicigerus* Benth. in his enumeration (l. c. p. 43) as *Andropogon cinctus* Steud. and observes that he believes this to be specifically distinct from *Andropogon micranthus* Kunth. The differences in the number of spikelets per raceme are, however, not constant and both forms are not rare in the same panicle. The above mentioned plant Bureau of Science (no. 40508) is therefore accepted as a subspecies as follows:

Capillipedium arachnoideum Henr. subsp. **luzoniense** Henr. nov. subsp. Differt a typo praesertim statura minus robusta, culmis tenuioribus adpresse villosissimis, spiculis haud raro in eadem panicula ternatis vel quinatis et tunc spiculis hermaphroditis aristatis duabus praeditis.

Ins. Philippin. Sub-provincia Luzon. Insula Benguet, Mancayan to Baguio; leg. M. RAMOS et G. EDANO in Oct. 1921. Bureau of Science no. 40508. Typus in Herb. Lugd. Bat. sub no. 923.284—576.

When STAPF in 1922 treated the genus *Capillipedium* in HOOKER's Icones (Tabula 3085), he not only described extensively *Andropogon glaucopsis* STEUDEL as *Capillipedium glaucopsis* (STEUD.) STAPF, but he gave at the same time very valuable information on the synonymy of the other species. We know that HACKEL distinguished besides his *A. Hugelii* only 2 species, *A. micranthus* (now *C. parviflorum*) and *A. montanus* ROXB. The latter does not belong however to the genus *Capillipedium* according to HOOKER, who examined ROXBURGH's drawings and the *Andropogon montanus* as described by HACKEL has to bear another name. HOOKER therefore accepted the name *Andropogon assimilis* STEUDEL, mentioned by ZOLLINGER in Syst. Verz. p. 58 as a nomen nudum (Zoll. no. 859 from Bandoeng) but described in the same year by STEUDEL in his Synopsis, although HOOKER did not see the type or other Javanese specimens and accepted the correctness of HACKEL's identification of the Indian plant with it. But STEUDEL described at least three species of this group, *Andropogon assimilis* STEUD. Syn. p. 397, *Andropogon glaucopsis* STEUDEL p. 397 and *Andropogon subrepens* STEUDEL p. 397. The first one is not accepted by STAPF who gave as a synonym, *Andropogon assimilis* HOOK. F. Fl. Brit. India Vol. VII. p. 179 vix STEUDEL.

Miss CAMUS however, had already in March 1922 made two combinations in the genus *Capillipedium*. One is *Capillipedium cinctum* (STEUD.) CAMUS based on *Andropogon cinctus* STEUDEL, the other is *Capillipedium assimile* (STEUD.) CAMUS based on *Andropogon assimilis* STEUDEL. The first combination accepted by CAMUS belongs certainly to *Capillipedium parviflorum* (R. BR.) STAPF. The other, however, is the species HACKEL described as *Andropogon montanus*. We have here therefore a contradiction between the opinions of STAPF and Miss CAMUS.

STAPF mentioned Java for his *Capillipedium glaucopsis* and Miss CAMUS too. STAPF says that it is locally abundant, often imitating small bamboos.

BLATTER treated this group also in his Revision of the Flora of the Bombay Presidency Part III Gramineae, in Journal of the Bombay Nat. Hist. Soc. Vol. XXXII, No. 3 (1928) p. 420. He treated three species but overlooked STAPF's combinations in 1922 and that of CAMUS in 1921.

He gave a description of the genus and a key for the three species *C. assimile*, *Hugelii* and *filiculme*. After the elimination of *C. filiculme* (stems decumbent and interlaced, very weak, filiform) he treated the two others with stems more or less suffrutescent below, stiff, erect. To distinguish the two remaining species he says that *C. assimile* CAMUS has the nodes of the stem glabrous; callus shortly bearded, whereas *C. Hugelii* has the nodes of the stem bearded; callus densely villous. BLATTER could give these differences because the true *Capillipedium parviflorum* (with hairy nodes) does nor occur in the region he treated. *Capillipedium Hugelii* has distinctly bearded nodes (of which I could convince myself), it agrees perfectly with the description of HACKEL and in the spikelet characters with a fragment of the type, formerly received from this mentor. Material seen from localities in the Bombay Presidency and adjacent regions has often glabrous nodes and material from Sumatra exactly matches it. The same species with its bamboo-like habit occurs in Timor (leg. FORBES) so that I am convinced that this species occurs in Java too. STAPF mentioned in his *Capillipedium glaucopsis* that the sheaths are "glabrae vel ad nodos et ad ora barbatae" and delineates a plant with hairy nodes. CAMUS says of her *Capillipedium assimile* "noeuds pubescents". HOOKER says "nodes more or less bearded."

From the data, compared with the material at hand, it is absolutely impossible to recognize the various species in a genus like *Capillipedium* only from the floral characters, because these are in all the species of the same scheme, and by looking only to these characters it is evident that in local floras one could not always distinguish the various species and preferred to accept only one, in a rather broad sense. But here we have, as in so many rather uniform genera, to attribute much importance to the various vegetative characters. Good and complete material is therefore always well to determine, poor specimens or fragments scarcely so. HOOKER said already that it is very difficult to distinguish *A. micranthus* (*parviflorus*) from small forms of *A. assimilis*. *Capillipedium filiculme* (HOOK. F.) STAPF is in this genus, so far as known, the only annual species, although I could not verify this. I wish to treat here the three species described by STEUDEL, already mentioned above, viz. *Andropogon glaucopsis, Andropogon subrepens* and *Andropogon assimilis*, they are numbered consecutively. The first and the second one are based on plants of WALLICH, *A. assimilis* on ZOLLINGER 859 from Java. As the names in ZOLLINGER's Verzeichniss are nomina nuda, we have only to discuss the 3 species in STEUDEL's Synopsis. *A. glaucopsis* is based on WALLICH Cat. 8786 and 8787 from Nepal. STEUDEL mentioned the nodes as "villoso-barbatis" which perfectly agrees with WALLICH 8786, seen by me, the other number was not studied. *Andropogon subrepens* based on WALLICH Cat. no. 8789 and *Andropogon assimilis* have glabrous nodes. BLATTER in his key, mentioning *Capillipedium assimile* CAMUS as having glabrous nodes had therefore the true *Andropogon assimilis* before him. Other authors who treated the various species of STEUDEL as a single one mentioned the nodes as hairy or glabrous.

We have now to make the following conclusion. Besides the various species of *Capillipedium* as given by HOOKER and by STAPF there is a perennial species, which in its vegetative characters is very striking and different from all the other ones. Its habit was accurately characterized by HACKEL as follows: "Culmi inferne decumbentes radicantesque a basi ramosi vel ramosissimi, ramis a culmo patentibus; vaginae inferiores a culmo solutae, distantes. Paniculae rami ramulique in axillis longiuscule (etsi interdum parce) barbati." For this species we are inclined to accept the name *Capillipedium glaucopsis* (STEUD.) STAPF as the earlier one, based on *Andropogon glaucopsis* STEUD.. STAPF's description agrees with STEUDEL's description as to the nodes. I am sorry to say that *Andropogon glaucopsis* and *A. assimilis* cannot be maintained as two species, differences other than the hairy or glabrous nodes could not be sharply fixed, as abundant material was not at hand. In the future field studies and a large collection from various parts of its area will help us to solve this problem. Very good material from Sumatra with glabrous nodes is certainly *Capillipedium assimile* CAMUS and I regret that I could not study ZOLLINGER's no. 859 from Java. In my opinion the species, although not mentioned in BACKER's "Handboek", occurs certainly in Java because such eminent agrostologists as HACKEL and STAPF mentioned it so emphatically.

But there are many pitfalls on the paths of nomenclature. The combination based by STAPF on *Andropogon glaucopsis* in STEUDEL's Synopsis is invalid, because there exists an overlooked earlier *Andropogon glaucopsis* by STEUDEL in 1840, based on *Andropogon macrourus* var. *glaucopsis* ELLIOTT and published in 1816. This earlier name applies to a quite different North American grass. The epithet *glaucopsis* can therefore never be used when we accept the three species of STEUDEL as but one more or less variable species. There are no important differences between the two remaining species of STEUDEL, viz. *A. subrepens* and *A. assimilis*, both have glabrous nodes. I therefore propose to call the species, formerly named *Andropogon montanus* Hack., **Capillipedium subrepens** (Steud.) Henr. nov. comb. because Steudel's *A. subrepens* has priority over *A. assimilis*. Stapf's *C. glaucopsis* with hairy nodes must receive a new name. I propose **C. subrepens** var. **glaucophyllum** Henr. nom. nov. for *Andropogon glaucopsis* Steud. (1855) non Steud. (1840).

A very polymorphous group of grasses is represented by the difficult genus *Isachne*. Very distinct as a genus, its members are, however, often confounded and a renewed study of the various types in connection with abundant material is the only way to solve the difficulties. A monographical study of this interesting genus is highly necessary for its further study. For the present I wish only to clear up some points, interesting for a study of the Javanese members of this genus.

In the first place we have *Isachne globosa* (Thunb.) O. K., a well-known species, although its characters are still insufficiently known. This species was described by Steudel in 1846 in Flora as *Panicum* (*Isachne*) *lepidotum* from a specimen collected by Goering. This type is in Steudel's own herbarium. Afterwards, during his visit to Leiden, Steudel studied the famous collection of Japanese grasses in Siebold's herbarium and saw the same plants there. Among Siebold's plants there are two sheets in Steudel's script with his specific name *lepidotum*. Both sheets bear also the name *Milium globosum* Thunb., given by Siebold. Steudel's label reads: "*Panicum* (*Isachne*) *lepidotum Steudel. An Milium globosum Thunb.? sed pedunculi infra apicem cingulo luteo notati, vix possunt observavi.*" Steudel therefore observed the curious nectariferous spots which are found on the pedicels of the spikelets. These spots are yellowish, oblong inspissations at about half the length of the pedicels, they are not represented if the spikelets are sessile but mostly very distinct in the longer pedicelled ones. These spots are very striking by the contrast with the dark pedicels and are quite analogous with the spots found below the spikelets in various members of *Eragrostis*; in many cases the pedicels seem to be articulated. Thunberg described his *Milium globosum* as having "*pedicellis cingulo luteo*". So far as is known to me this character was never mentioned in the recent literature as represented in *Isachne* and Steudel was the only one who saw it. Steudel, however, did not publish this observation. In his description from the year 1846, he says "*nodis sublepidoto-adspersis*, etc., *glumis 7-nerviis, ovatis obtusissimis, paleis flosculi coriaceis glabris, interiore flosculo foemineo vel neutro sterili*". Steudel says further that the species is most nearly allied to *Panicum Isachne australe* R. BR.. A second sheet bears also STEUDEL's determination in his script reading "*Isachne lepidota Steudel in Flora 1846 p. 19. nomen infaustum; nodi saepe glabriusculi, folia sublepidoto asperula.*" The specific name *lepidotum* is deviated from the character of the species. For this species bears in all its vegetative parts curious scattered short scaly or squamiform hairs, especially visible under a strong lens, the nodes of the culms are glabrous and here these hairs are not very conspicuous; so STEUDEL's note on the label after "nomen infaustum", cited above, is well understandable. SIEBOLD's collection of *Isachne globosa* is very good and large and although these plants are not the actual types of STEUDEL they are, as identified by him, of great value for one who has to form an opinion of *Isachne globosa. Isachne australis* R. BR. described in 1810 from Australia is the same species, as to the material seen from that region.

The characters to recognize this *Isachne globosa,* besides the nectariferous spots on the pedicels, are chiefly the following: the nodes are quite glabrous, that is without any hairs or pubescence, the two glumes are equal in length, many-nerved, glabrous, obtuse, tips rounded and more or less hyaline margined, there are two glabrous flowers per spikelet, unequal in length, the third glume is longer and more acute than the fourth glume which is more rounded and as long as glume I and II. When the spikelet is closed glume III is protruding above it. The spikelets are 2.25—2.5 mm long. Only plants agreeing in these characters are to be accepted as true *Isachne globosa.* The species, defined in this way, has a large distribution, it occurs from Japan westward through China, Indo-China and Central India, always in the hotter parts, and south to Burma and Ceylon and is known from the Philippines (rare), Celebes, Sumatra and Java, Australia and New Zealand. Most of the synonyms given by HOOKER F. in his Flora of British India belong to this species with exception of *Panicum nodibarbatum* HOCHST., in Plantae Hohenackerianae no. 127, published in 1854 by STEUDEL. This is a distinct endemic species from the Nilghiri Hills with densely villous nodes, and shorter broader leaves. It is transferred by me to the genus *Isachne* as **Isachne nodibarbata** (HOCHST.) HENR. nov. comb. based on HOCHSTETTER's no. 127 as published by STEUDEL Synops. (1854) p. 95.

Isachne globosa (or *australis*) is not mentioned by BUSE in his treatment of the Javanese grasses, collected by JUNGHUHN. The latter collected *Isachne globosa,* however, in Sumatra near Padang and in Java near Batavia and Djokjakarta. BUSE did not recognize them and regarded them as the allied *Isachne miliacea* ROTH. The plants from Padang were described by him as *Isachne miliacea* ROTH var. *obscura* BUSE, the glumes are upwards, along the nerves, very rough and provided there with long hairs. Under *Isachne globosa* O. K. it is placed therefore as a variety **obscura** (BUSE) HENR. nov. var. based on BUSE's variety under *Isachne miliacea* ROTH.

Isachne miliacea ROTH as described by ROEMER and SCHULTES Syst. II (1817) p. 476 is considered as an earlier name for *Isachne minutula* (GAUDICH.) KUNTH. Under the last name the species was known to BUSE, who described ZOLLINGER's no. 271 as *Isachne minutula* KUNTH var. *javaninica* BUSE. But the same number ZOLLINGER 271 was mentioned by MORITZI in Syst. Verzeichniss (1846) p. 102 as *Panicum obliquum* ROTH with a question-mark, and in 1854 by ZOLLINGER in Syst. Verz. Heft 1. (June 1854) the same number 271 as "*Isachne Kuntheana* NEES MS. Ad marginem paludium pr. Tjikoya" on p. 54. The latter is a nomen nudum, STEUDEL mentioned the same number 271 when he described the *Panicum Kunthianum* WIGHT et ARNOTT in his Synopsis (1854) on p. 96 giving *Panicum obliquum* Zoll. herb. 271? and *Isachne Kunthiana* NEES mpt. as synonyms. STEUDEL's description of *Panicum Kunthianum* WIGHT et ARNOTT as published by him, was based on *Isachne Kunthiana* WIGHT et ARNOTT, nom. nudum in WIGHT cat. no. 1659, which therefore becomes the type of *Panicum Kunthianum* WIGHT et ARNOTT ap. STEUDEL Synopsis p. 96. This type, however, is totally different from ZOLLINGER's number 271. *Isachne minutula* KUNTH var. *javanica* BUSE based on ZOLLINGER 271 in the Rijksherbarium is certainly MORITZI's *Panicum obliquum* and differs from the typical *Isachne miliacea* ROTH in the setulose-viscid spikelets, hence its name becomes **Isachne miliacea** ROTH ap. R. et S. var. **javanica** (BUSE) HENR. nov. var.

Miss CAMUS identified *I. miliacea* ROTH as *I. polygonoides* (LAMK.) DOELL. The latter, however, is a different American species characterized by the pubescent very dissimilar flowers of the spikelets and the ovate-clasping blades.

We have now to discuss the species, described by STEUDEL as *Panicum Kunthianum* WIGHT et ARNOTT, based on WIGHT Cat. 1659, from Ceylon. This species is described by HOOKER in Fl. British India p. 21 as *Isachne Kunthiana* WIGHT et ARNOTT but that is a herbarium name and a nomen nudum, placed by THWAITES in Enum. Pl. Zeyl. definitively under *Isachne*, but MIQUEL published *Isachne Kunthiana* NEES in 1855 in his Flora Ind. Bat., Vol. III p. 460. MIQUEL's description was prepared from ZOLLINGER's no. 271, his determination was wrong but he intended to transfer *Panicum Kunthianum* WIGHT et ARNOTT in Hb. WIGHT, STEUD. l. c. p. 26 to the genus *Isachne.* In such a case, so often occurring in the literature, the combination given from a validly published name but transferred to a wrong species is nevertheless valid. See *Digitaria filiformis* (L.) KOELER, described from a European species but transferred to a different American one. *Panicum Kunthianum* is therefore to be named *Isachne Kunthiana* (WIGHT et ARN.) NEES ap. MIQUEL. THWAITES's combination for the Ceylon plant is given in the year 1864 and invalid on account of the earlier one in 1855.

The true *Panicum Kunthianum* was found by BLUME in Java on Mount Gedeh, Rawa Tjiburrum and is, so far as I could find out a weak annual, procumbent and rooting at the nodes with short, more or less contracted panicles. BLUME's plant agrees with material seen from Sumatra (Padang, Banka, Enggano) and Borneo. At present the definite status of the species cannot be given as the actual type (WIGHT no. 1659) was not at my disposal. We are therefore totally dependant on HOOKER's treatment of this species, which he mentioned from the Nilghiri and Travancore Hills, Singapore, Ceylon, Java and Borneo; HOOKER certainly did not see Javanese material, he cited only MIQUEL's data, but he certainly studied WIGHT 1659 from Ceylon and his description agrees with STEUDEL's *Panicum Kunthianum.*

STEUDEL's description runs as follows: "culmo repente; foliis ovato-lanceolatis subcordatis vaginisque tuberculatis hirsutisque; ligula setosa; panicula parva ovali rigida (vix pollicari) e ramulis alternis 4—5 patentibus sub-6-floris; pedicellis 2 inferioribus subbifloris, 2 superioribus unifloris; spiculis minimis ovatis monoicis, inferiore flosculo hermaphrodito-masculo laevi, superiore stipitato foemineo hirto; glumis flosculos superantibus apicem versus e tuberculis hirsutis."

HOOKER says (l. c. p. 21): "stem 6—10 in. more or less hairy, leaves ovate or ovate-oblong, panicle 2—2½ in., branches few, gl. I and II subacute or subcuspidate 7—9 nerved. Stem ascending, geniculate, branched. Leaves ½—2½ in., striate, spreading, smooth or scaberulous above, base cordate, midrib and nerves obscure; ligule of hairs. Panicle 2—2½ in.; branches short, rather stout, at length horizontal, pubescent or glabrous. Spikelets $^1/_{20}$—$^1/_{16}$ in., very shortly pedicelled; gl. I and II smooth hispid or bristly; III and IV subequal or III rather the largest, glabrous or puberulous." STEUDEL described only one species, but HOOKER's description applies to two species, one of low and another of high elevations. The Javanese specimen form Mount Gedeh is not exactly located as to its altitude. The corresponding specimens were all found at low altitudes. Banka 100 m, Borneo 700 m, Enggano 100 m.

From HOOKER's *Isachne Kunthiana* we have to exclude the Nilghiri plant (I saw PERROTTET 1353), with pubescent nodes and a more open different panicle. This plant is better considered as a distinct species, it was described by STEUDEL as *Panicum Metzii* HOCHST. which now becomes **Isachne Metzii** (HOCHST.) HENR. nov. comb. based on HOHENACKER's plant no. 1276. *Isachne Metzii* HOCHST. ex HOOK. F. Fl. Brit. Ind. VII. 21 as given in the Kew Index is only a synonym under *Isachne Kunthiana.*

After the elimination of this species there remains a much more homogeneous species agreeing in its chief characters with STEUDEL's description of *Panicum Kunthianum.* This species has tuberculate, cuspidate, equal glumes, much longer than the two flowers, one of them being glabrous, the other pubescent. In other characters it agrees with STEUDEL's description. As long as the various species from Ceylon, as hitherto described are not critically treated, we are not able to establish correct names and we are for the moment forced to accept the name of the grass of Mount Gedeh as proposed by me above. I am not certain as to the identification of STAPF's *Isachne Kunthiana* NEES from Mount Kinabalu, collected by HAVILAND no. 1408 at 8000 feet. This number is cited also by MERRILL in his bibliographic enumeration of Bornean plants. It may be an allied species of the *I. pangerangensis* group.

Another species from rather low altitudes is *Isachne miliacea* ROTH. It was insufficiently described by ROEMER and SCHULTES in 1817 from ROTH's manuscript. The locality is given only as "in India Orientali". The description runs as follows: "panicula subeffusa capillari, ramis subverticillatis ramulisque asperis flexuosis, spiculis ovalibus obtusissimis, mascula corolla femineam supereminente, foliis lineari-lanceolatis asperis, vaginis margine ciliatis. Corolla exterior mascula oblonga, interiore feminea ex subrotundo ovata dorso pubescente paullo longior."

ROTH afterwards (in 1821) gave a new, much longer description, the type was cited as collected by HEYNE ex India orientali, and it may be located, as HEYNE collected near Madras and his large collections were studied and published by ROTH in his Novae Plantarum Species. The diagnosis of ROTH's *Isachne miliacea* agrees verbatim with that of ROEMER and SCHULTES (they copied indeed from ROTH's manuscript). From this diagnosis and from the more exact data given by ROTH we are able to recognize the species. This *Isachne miliacea* is a species with many characters in common with *I. globosa.* From the large material, seen by me, it is evident that in the spikelet characters there are no striking differences, the spikelets are only much smaller, only 1.8 to scarcely 2 mm long, the equal lower glumes are, however, faintly nerved and subpubescent on the back, the lower oblong masculine glabrous floret is longer than the glumes and the upper hermaphrodite one is pubescent, ovate and obtuse and as long as the glumes. These characters agree with *I. globosa,* which has a different panicle and larger spikelets. The diversity between the two flowers in each spikelet is, however, much more striking in *I. miliacea,* the latter is, moreover, very distinct in the vegetative parts, being a much more elegant and smaller species with thinner culms and short broad ovate-lanceolate blades. The affinity with *Isachne globosa* is much expressed also by the same nectariferous spots, found on the pedicels, especially at maturity.

Panicum adstans STEUD., (type CUMING 2288 from Malacca) belongs in all its characters to *Isachne globosa* and is therefore wrongly placed by MIQUEL and by BACKER under *I. miliacea,* but correctly placed by HOOKER.

Panicum Benjamini published by STEUDEL is merely a superfluous name for ROTH's species, the description of ROTH was copied and *Isachne miliacea* ROTH cited as a synonym.

A most puzzling complex was accepted by BACKER in his "Handboek" as *Isachne pangerangensis* ZOLL. et MOR. sensu ampliato. This is indeed the first valid name for a very distinct species, most insufficiently described by MORITZI in his Syst. Verz. (1845—46) p. 102. It was based on ZOLLINGER's no. 1917, collected in graminosis siccis udisque montis Pangerango 8—9000′ s.m. Febr. 1844, and published with the following description: "caespitosa foliis distychis lanceolatis acuminatis concinne multisulcatis duris margine setoso-ciliatis panicula simplici pauciflora (4—8 fl.)". This description is, indeed, insufficient to recognize the species as nothing is said about the various important characters of the spikelets.

When STEUDEL treated the species in 1854, he gave a longer description, but is is not quite certain that he saw the actual type of ZOLLINGER and MORITZI, which is probably in the Vienna Herbarium. STEUDEL, however, cited the number 1917 of ZOLLINGER as being his *Panicum pangerangense* and I take it for granted that he treated the same species as did MORITZI. STEUDEL's description runs as follows: "Radice subrepente caespitifera; culmis humilibus simplicibus vel ramosis (1—2-pollicaribus vix longioribus) undique vaginis hirsutis tectis; foliis distichis lanceolatis acuminatis duriuscule rigidis concinne nervosis, margine setoso-ciliatis, post lapsum setularum denticulatis ($^1/_2$—$^3/_4$″ longis, 1—2‴ latis); paniculae simplicis radiis solitariis vel binis pauci-(2—6-)-floris; spiculis brevi-pedicellatis obovatis obtusis; glumis flosculos subaequantibus (non patulis) glabris striatulis vix mucronulatis; hermaphroditis subaequalibus glabris obtuse mucronatis. Forsan P. Zollingeri Steud. (nr. 797) var.?" From this good description the plant is indeed recognizable by the short, up to 5 cm long stems, densely obtected by the hirsute sheaths; the distichous acuminate rather rigid blades, setosely ciliate along the margins, the subsolitary branches of the panicle, with few short-pedicelled flowers, the obovate obtuse spikelets, the subequal glabrous glumes, which are scarcely mucronate and the equal glabrous obtusely mucronate lemmata, are important characters given in this description. KOORDERS gave in his Excursionsflora a very short description which applies to that of STEUDEL and said that this species was only known to him from the 3060 m high summit of the Pangerango, but afterwards he mentioned, besides many specimens from the Pangerango, also Mount Papandajan as a locality.

ZOLLINGER's number 1917 is not represented in the herbarium at Leiden; to BUSE, who studied the Javanese grasses from that Herbarium, this plant was unknown, even MORITZI's description, although already published in 1846, is not mentioned in BUSE's Enumeratio from 1854. BUSE had the beautiful collections made by JUNGHUHN at his disposal. He studied them accurately and his misidentifications are principally caused by the lack of material for comparison, especially as to authentic material.

Thus it is well to understand that ZOLLINGER's species, represented in JUNGHUHN's collection was described once more as *Isachne monticola* BUSE from the central plateau of Mount Mandalawangi. The type material was at my disposal and agrees with STEUDEL's description of *Panicum pangerangense* with exception of the pubescent flowers, mentioned by BUSE. BUSE's type material from JUNGHUHN is quite uniform and the material of REINWARDT, mentioned afterwards by him is quite similar. It is therefore rather certain that we know what we have to accept as the typical *Isachne pangerangensis.* Before we treat other varieties of the species, it is noteworthy that this status was also found in the Philippines and described by MERRILL as *Isachne vulcanica* MERR. from Negros. This species belongs as to the description and the material seen (MERRILL no. 6975 duplic. type, and KNEUCKER's exsicc. no. 810) to BUSE's *Isachne monticola,* having sparingly pubescent lemmata, but differs slightly in the tubercle-based hairs on the glumes upwards and in the thickened margins of the blades which are not rigidly long ciliate as in the true *I. pangerangensis.* All these specimens compared are at once recognized as belonging to but one species, a species very distinct by the *"very shortly pedicelled"* spikelets in much reduced panicles. The so-called *I. pangerangensis* from Borneo f. i., with long pedicelled spikelets, represents a different species. To recognize the true *Isachne pangerangensis* we have therefore besides the curious cushionlike habit, the form of the inflorescence and the characters of the spikelets with their equal or nearly equal glumes, the lower one rather abruptly although very shortly mucronate, the upper one obtuse. In the closed spikelets the two glumes are slightly longer than the two equal flowers, in the open mature spikelets, by the development of the lemmata and paleae, gl. II becomes as long as gl. IV or even slightly shorter, gl. I is but minutely longer than III and becomes somewhat inrolled and more acute. The ripe open spikelets with their much swollen flowers have therefore an aspect different from the younger still closed ones.

There is another plant from Java to treat here, viz. *Panicum rhignon* STEUDEL with *Isachne rigida* NEES mpt. as a synonym. I did not see this plant but the good description of STEUDEL enables us to recognize it. The description says: "Culmis humilibus caespitosis; foliis confertis lanceolatis striatis vaginisque e tuberculis setoso-ciliatis; paniculae parvae racemosae compositae radiis strictis patulis oligostachyis; spiculis alternis brevipedicellatis obovatis; flosculis glabris aequalibus, inferiore foemineo, superiore masculo; glumis patulis, inferiore mucronata, superiore obtusa. Variat: culmo apice simpliciter racemoso."

We learn from this description, that most of the given characters apply to *Isachne pangerangensis,* but we find also some differences, although the vegetative parts perfectly agree; the panicles deviate in being racemose and more compound, with strict, longer, spreading, but few-flowered branches; the shortly pedicelled glabrous spikelets point to *I. pangerangensis,* although the glumes seem to be longer and the lower one more acute. Specimens agreeing with these data occur indeed in the collections at my disposal and represent a distinct status of the species as treated here. The longer, stiffly spreading branches, with the short branchlets, bearing shortly pedicelled, more acute spikelets are the most important and striking characters. If this form is not specifically distinct from the typical *Isachne pangerangensis,* it is certainly worthy to be kept separate as a variety. *Isachne rigida* NEES ap. MIQUEL Fl. Ind. III p. 461 represents the same plant, STEUDEL's description of *Panicum rhignon* was copied and *Isachne rigida* NEES mss. and *Panicum rhignon* STEUD. were given as synonyms. MIQUEL observed already

"Anne eadem ac I. monticola licet diagnosi depugnante?" JUNGHUHN's specimen cited by MIQUEL is indeed BUSE's *I. monticola* and *I. pangerangensis,* the latter was not seen by MIQUEL who only copied the description of STEUDEL.

Isachne rigida NEES as accepted by HOOKER in Fl. Br. Ind. p. 24 is a very different species with a small pyramidal glandular panicle, according to the description, and with few scarcely 1½ mm long, hispid spikelets on long, slender pedicels. This species from Tenasserim and the Nicobar Islands cannot bear the name of *Isachne rigida* on account of MIQUELS' earlier name for a different species. It may be **Isachne pilulifera** (NEES) HENR. based on *Panicum piluliferum* NEES ap. STEUD. Synops. (1854) p. 94. HOOKER said: "I take this to be the Javan *I. rigida* Nees, from Steudel's description. It further agrees well enough with the descriptions of *I. firmula* and *I. monticola* Buse." There are in HOOKER's description as pointed out by me above, very important differences between the Javanese plant and the Indian one, so that we do not at all agree with HOOKER's statement. Accepting STEUDEL's species *Panicum rhignon* as a variety of *Isachne pangerangensis* Z. ET M. its name becomes var. **rhignon** (STEUD.) HENR. nov. var. based on STEUDEL's species of that name.

BUSE described from the "*pangerangensis*" group also another species, viz. *Isachne firmula* BUSE from Mt. Oengaran and Mt. Kawi in Java. A renewed inspection of the types gave as the result that this species is in nearly all its characters a large form of *Isachne pangerangensis.* It is at first sight a very different-looking plant but, as may already be seen from BUSE's description, not with very striking differences. In the spikelets BUSE's plants differ only by the hairy glumes and in the vegetative parts by the glabrous sheaths, ciliate only along the margins, although BUSE described also a very hirsute variety as *β marginata* BUSE. The larger, although contracted panicle, much resembles an enlarged panicle of the true *I. pangerangensis,* of which the var. *marginata* represents a more closely allied form. BUSE's species is certainly not worthy of specific rank and even not as characteristic as STEUDEL's *Panicum rhignon.* BUSE's plants may therefore only be accepted as var. **firmula** (BUSE) HENR. nov. var. of *Isachne pangerangensis* Z. ET M. Recently, HITCHCOCK, in his article on the Papuan grasses collected by BRASS, accepted *Isachne firmula* BUSE and *Isachne pangerangensis* Z. ET M. as two different species. Indeed, with the types only before us we are inclined to accept them as distinct, but they are connected by BUSE's var. *marginata* although I did not find series gradually merging into each other. I did not see the grasses from the BRASS-collection, which are unfortunately not represented in our herbarium.

A different opinion as to these various species is given by Miss CAMUS in Fl. génér. de l'Indo-Chine. Under *Isachne Myosotis* NEES described in 1850, she mentions as synonyms *I. firmula* BUSE, *I. rigida* NEES, *Panicum Rhignon* STEUD. and *Panicum piluliferum* NEES. *Isachne Myosotis* NEES, treated as an annual species, is different from *Isachne Myosotis* BENTHAM. It is, however, evident that Miss CAMUS copied the wrong synonymy from HOOKER.

Some other species of *Isachne* are not yet recognized, viz. *Panicum batavicum* STEUD., published with the name *Isachne javana* NEES as a synonym. STEUDEL's species is probably a large form of *Isachne globosa* O. K. Such a robust state of this species was collected by BALANSA near Batavia. This plant fairy well agrees with STEUDEL's description. HOOKER accepted *Isachne javana* NEES ap. MIQUEL as a member of the Flora of British India. He tells us that it is a much larger plant than *Isachne australis* (*globosa*), but his description differs in various respects from that of STEUDEL and certainly points to another species with ciliolate nodes, lax panicles with very long and slender branches and pedicels and obscurely nerved glumes. Without HOOKER's British Indian material (from Upper Burma, Malacca and Perak), it is however, impossible at present to establish the species and it is impracticable to propose a name for it.

Isachne pulchella ROTH was formerly accepted as being a species of the genus *Sphaerocaryum* NEES. The latter is a monotypic genus with *I. elegans* NEES as the type. On account of HOOKER's statement that *Isachne pulchella* ROTH was a synonym of NEES's species, MERRILL made in 1916 the combination *Sphaerocaryum pulchellum* (ROTH) MERR.. CAMUS made the same combination in 1923, overlooking that of MERRILL. Recently PILGER has pointed out that ROTH's *Isachne pulchella* according to his type at Berlin, does not belong to the genus *Sphaerocaryum* but is a species of *Isachne* with two flowers per spikelet, the lower ones oval-oblong, less indurated and smaller, the upper ones oval, ventricose and pubescent. PILGER's discovery made it necessary to accept a new name for the species of the genus *Sphaerocaryum*, but at the same time ROTH's name *pulchella* became valid for a species of *Isachne*. PILGER proposed for the species of *Sphaerocaryum* the name *S. malaccense* (TRIN.) PILGER. This species, although occurring in our Archipelago is not yet found in Java. It is a pity that PILGER, who studied ROTH's *Isachne pulchella*, did not indicate its synonyms. We therefore do not know at present which species of *Isachne* must bear ROTH's name.

I will try to give a solution. Studying the *Isachne miliacea* of ROTH such as it is generally accepted in the literature, it is a striking fact that there occur in this species two groups, one with larger and one with smaller spikelets. Both have a male flower longer than the female one and these are of a different form and outline. It is probable that both forms were known to ROTH, the form with larger spikelets is the *I. miliacea* ROTH as represented by MERRILL's plants from the Philippines (KNEUCKER's exsicc.). The form with much smaller spikelets is probably STEUDEL's *Panicum bellum,* a new name given to ROTH's *Isachne pulchella.* STEUDEL consequently accepted both species of ROTH as two distinct species. In KUNTH's Enumeratio (1833) we find *I. miliacea* and *I. pulchella* maintained as two different species. As to the plants occurring in Java we know that ZOLLINGER's No. 271 is such a small-flowered specimen which agrees in its characters with ROTH's description of *I. pulchella.* I am inclined to accept the two species of ROTH as valid ones, not only on account of the differences in length of the spikelets but also on account of the statements in the literature that the "nodes of stem are glabrous or ciliate". This is mentioned by HOOKER, and BACKER mentions quite independently from HOOKER that the leaf sheaths are often hairy all-round at the base on the nodes. Now it is possible that the character of the nodes (hairy or not) runs parallel with the length of the spikelets, in which case we have a good support for the diversity of both species.

In the genus *Digitaria,* which has for many years been extensively studied by me and of which a big manuscript with all the critical data is almost finished, we had formerly for the Javanese flora 7 species, which are treated in BACKER's well-known "Handboek voor de Flora van Java", Afl. 2 (1928). My own investigations have brought this number to 16 species. In BACKER's book we find on p. 125 *Digitaria Perrottetii* BACKER, a species which occurs between 1200 and 2300 m above sealevel in various localities from West to East Java. I had found it already in our herbarium at Leiden and recognized it as a very distinct species which I named *Digitaria remota* HENR.. It is evidently very distinct from KUNTH's *Panicum Perrottetii,* which was described from West Africa and is a totally different species. It is more allied to the so-called *Paspalum Perrottetii* HOOK. F. from British India; the latter is, however, also a different species, which has to bear the name *Digitaria Wallichiana* STAPF. *Digitaria Perrottetii* BACKER is, of course, invalid on account of STAPF's earlier combination for the African species.

I give here the following description of the new species.

Digitaria remota Henr. nov. spec. Perennis, culmi tenues, partim repentes, partim adscendentes vel erecti, glabri, plurinodes, floriferi ad 50 cm vel plus alti; internodia inferiora haud rariter hirsuta. Vaginae foliorum basin versus pilis longis praeditae, superne glabrae vel sparse pilosae; ligula elongata, scariosa, ad 5 mm longa, laminae 4—8 cm latae, 5—17 cm longae, lineari-lanceolatae, sensim angustatae, marginibus scabris, utrinque vel supra tantum pilis sparsis, patentibus, basi tuberculatis, praeditae. Inflorescentia paniculata, ambitu ovali-oblonga, patula, rhachi communi ad 10 cm vel plus longa, ramis subverticillatis 8—10, interdum ad 20, verticillis distantibus; racemi inferiores paniculae 7 vel interdum ad 10 cm, summi interdum vix 3 cm longi, laxiflori, ad basin breviter nudi. Spiculae binae, remotae, altera breviter pedicellata, pedicello ½—1 mm longo, altera longiter vel longe pedicellata, pedicello 2—3 mm longo, 2—2½ mm longae, purpurascentes, ovato-oblongae vel ovato-lanceolatae; gluma inferior nulla vel rudimentaria, gluma II spicula paulo brevior, lanceolata, acutiuscula, 3-nervis, gluma III spiculam aequans, 7-nervis, nervis prominentibus, plus minusve aequidistantibus, ambae inter nervos et versus marginis pilis albis brevissimis haud raro subobsoletis, appressis, seriatim obsitae, gluma IV (lemma fertilis) spiculam vix aequans, lanceolato-oblonga, breviter acuminata, convexa, chartacea, subtiliter punctulata vel punctato-striolata, ad maturitatem fuscescens. Antherae ad 2 mm longae. Fructus ad 1¼ mm longus.

Java: Soerakarta; Bojolali, leg. Beguin in 1918. Typus speciei in Herb. Lugd. Bat. sub no. 920.248—59.

Kediri; Malang, Goenoeng Kawi, west slope G. Boetak, circ. 2300 m. leg. Docters van Leeuwen-Reijnvaan no. 12425 in 1929.

Besoeki; Ijang plateau, circ. 2300 m. leg. Koorders no. 43571 in 1916.

Besides these specimens in the collection of the Rijksherbarium, I saw many other plants from various localities in Java, in Backer's private collection.

Digitaria longiflora (Retz.) Pers., although somewhat variable as to the habit of the vegetative parts, is always very characteristical by its verrucose hairs on the spikelets. This character is always the proof against *Digitaria violascens* Link, which lacks these hairs, although there are other important characters to separate the two species. I demonstrated formerly that the plants with perfectly glabrous spikelets had, moreover, different spikelets and such plants belonged to a distinct species which was already described by Buse as *Digitaria pseudoischaemum.* I made also the new combination *Digitaria fuscescens* (Presl)

HENR., which was based on *Paspalum fuscescens* PRESL. Having studied authentic material of PRESL's species I recognized that it is conspecific with BUSE's plant. This Javanese grass has therefore to bear the earlier name *Digitaria fuscescens.* It is noteworthy that this species was known long before PRESL described it, but is was not recognized. FLUEGGE, who in 1810 treated *Paspalum longiflorum* RETZ. in his monograph, described it as having hairy or glabrous spikelets. The plant with glabrous spikelets (our *D. fuscescens*) was collected by DU PETIT THOUARS in Mauritius and was cited by FLUEGGE. Mr. HUBBARD at Kew has seen this plant in the British Museum and recognized it as BUSE's species, which is quite in accordance with FLUEGGE's data and with my own investigations. It is very probable that this *Digitaria fuscescens* was also known to DESVAUX, who described it in his Opuscules in a chapter: Observations sur les Graminées et description de genres et espèces nouvelles de cette famille, as *Paspalum micranthum* DESV. "Crescit in insula Borboniae aut Mauritii.“ Unfortunately I failed to look for the type when I visited Paris, but DESVAUX's description and his locality are in accordance with our knowledge of *Digitaria fuscescens.* DESVAUX's species was published in 1831, but PRESL's name has priority if the two species are identical.

Concerning the *Digitarias* of Java it is quite certain that the true *Digitaria sanguinalis* does not occur in the tropical regions. What is called *Digitaria sanguinalis* in BACKER's "Handboek“, is commonly the tropical *Digitaria adscendens* (H. B. K.) HENR., but often also other more or less allied species, such as *Digitaria timorensis* (KUNTH) BALANSA, *Digitaria microbachne* (PRESL) HENR. and more rarely *Digitaria bicornis* (LAMK.) R. ET SCH. The latter is an earlier name for a species, described by WILLDENOW as *Digitaria barbata,* which was confounded by HOOKER with *Panicum heteranthum* NEES. For the latter I have already proposed the name *Digitaria dispar* HENR. This species was hitherto only known from the Asiatic continent. It was found, however, also on the island of Madoera by Prof. JESWIET. I was so fortunate as to find his good material which was determined as *Digitaria eminens* BACKER which is a totally different species.

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THE CONVOLVULACEAE OF MALAYSIA, III ¹)

by

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(Rijksherbarium, Leiden)

(Issued March 1st, 1940).

The genus Ipomoea.

HALLIER ²) subdivided the *Convolvulaceae* into two groups, viz. the *Psiloconiae*, with smooth pollen grains, and the *Echinoconiae* with spinose ones. The genera of the *Psiloconiae* occurring in Malaysia have been dealt with in parts I and II of the present paper, with exception of the genus *Erycibe*, which shall be treated in a special monograph.

The group of *Echinoconiae* contains two tribes, viz. 1. *Ipomoeeae* and 2. *Argyreieae*, both represented in Malaysia. The genus *Ipomoea* belongs to the *Ipomoeeae*.

The materials examined belong with a few exceptions to the herbaria of Buitenzorg (B), Leiden (L), Pasoeroean (Pa), Utrecht (U) and Wageningen (W). It seemed better not to ask for the loan of foreign collections during the war, broken out in the course of the year 1939.

XVI. IPOMOEA L.

L., Spec. Pl. ed. 1 (1753) p. 159; BLUME, Bijdr. (1825) p. 708; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 444; id. in Mém. Soc. Phys. Genève VIII (1838) p. 52; id. in DC., Prodr. IX (1845) p. 348; MIQ., Fl. Ned. Ind. II (1857) p. 601; BENTH., Fl. Austr. IV (1869) p. 412; BENTH. & HOOK., Gen. Plant. II (1876) p. 870; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 196; BAILLON, Hist. Pl. X (1891) p. 321; PETER in ENGL. & PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 28;

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¹) Part I in Blumea III, 1 (1938) p. 62—94; part II in Blumea III, 2 (1939) p. 267—371.

²) Versuch einer natürlichen Gliederung der Convolvulaceen auf morphologischer und anatomischer Grundlage in ENGLER's Botanische Jahrbücher XVI (1893) p. 453—591.

HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 583; id. in ENGL., Bot. Jahrb. XVIII (1893) p. 123; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 210; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 503, 510; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 128; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 310; KOORDERS, Exk. fl. Java III (1912) p. 116; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 229; RIDLEY, Fl. Malay Penins. II (1923) p. 459; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 364; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 521 — *Quamoclit* MOENCH, Meth. (1794) p. 453 (*Quamoelit*); CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 433; id. in DC., Prodr. IX (1845) p. 335; MIQ., Fl. Ned. Ind. II (1857) p. 593; PETER in ENGL. & PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 27; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 584; id. in ENGL., Bot. Jahrb. XVIII (1893) p. 154; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 505, 513; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 127; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 318; HOUSE in Bull. Torrey Bot. Club XXXVI (1909) p. 595; KOORDERS, Exk. fl. Java III (1912) p. 122; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 370; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 529 — *Batatas* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 434; id. in Mém. Soc. Phys. Genève VIII (1838) p. 45; id., in DC., Prodr. IX (1845) p. 337; MIQ., Fl. Ned. Ind. II (1857) p. 598 — *Pharbitis* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 438; id. in DC., Prodr. IX (1845) p. 341; MIQ., Fl. Ned. Ind. II (1857) p. 594; PETER in ENGL. & PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 31 — *Calonyction* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 441; id. in DC., Prodr. IX (1845) p. 345; MIQ., Fl. Ned. Ind. II (1857) p. 596; PETER in ENGL. & PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 26; HALL. f. in ENGL., Bot. Jahrb. XVI (1893) p. 583; id. in ENGL., Bot. Jahrb. XVIII (1893) p. 153; id. in Bull. Herb. Boiss. V (1897) p. 1021; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 504, 512; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 117; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 319; KOORDERS, Exk. fl. Java III (1912) p. 122; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 369 — *Exogonium* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 443; id. in Mém. Soc. Phys. Genèvě VIII (1838) p. 49; id. in DC., Prodr. IX (1845) p. 346; BAILLON, Hist. Pl. X (1891) p. 322; PETER in ENGL. & PRANTL, Nat. Pfl. fam. IV, 3a (1891) p. 27.

Herbs or shrubs, usually twining, sometimes prostrate or floating or erect. Leaves very various in form and size, entire, lobed or divided. Inflorescences axillary, cymose, 1—few or many-flowered, the cymes rarely paniculate; bracts various; flowers small, medium-sized or large. Sepals 5, herbaceous or subcoriaceous, very various in shape, often ovate to lanceolate, linear or elliptic, obtuse or acute to acuminate or aristate, unequal or equal, glabrous or hairy, persistent, often more or less enlarged in fruit. Corolla regular or rarely slightly zygomorphic, usually funnel-shaped or campanulate, more rarely salver-shaped, the limb plicate, shallowly or rarely deeply 5-lobed, midpetaline areas well defined by 2 distinct nerves. Stamens 5, generally inserted near the base of the corolla-tube, included or rarely exserted; filaments filiform or dilated at the base, often more or less unequal; anthers ovate, oblong or linear; pollen globular, spinulose. Disk annular. Ovary usually 2 or sometimes 4-celled, 4-ovuled, rarely 3-celled, 6-ovuled; style filiform, included, rarely exserted; stigma capitate, entire or often 2—3-globular. Capsule globose or ovoid, mostly 4 or rarely 6-valved, or splitting irregularly or indehiscent. Seeds glabrous or hairy, 4(—6) or less.

Distribution: Widely spread in the tropical and subtemperate regions of both hemispheres.

Remarks. HALLIER in his paper entitled Convolvulaceae africanae, published in ENGLER's Botanische Jahrbücher XVIII (1893) p. 81—160, gives a subdivision of the genus *Ipomoea* into 6 sections. These sections have been characterized by HALLIER as follows:

Sect. 1. *Calycanthemum* (KLOTSCH) HALL. f., l. c. p. 123. Small, mostly annual or rarely perennial, pilose herbs, with prostrate, erect or rarely twining stems; leaves cordate, subhastate, oblong, elliptic, or rarely pinnately lobed; flowers small or moderate; sepals ovate or lanceolate, acute, the base often broadened or auriculate; corolla white or pale pink, mostly small, rarely larger; seeds mostly shortly tomentose.

Sect. 2. *Dasychaetia* HALL. f., l. c. p. 130. Plants mostly large, perennial, prostrate or erect, strigose or woolly; leaves petiolate or sessile, ovate; flowers large; sepals lanceolate or setaceous, long pilose or woolly; corolla large, pale pink.

Sect. 3. *Pharbitis* (CHOISY) HALL. f., l. c. p. 131 ¹). Annual or rarely perennial high-twining, rarely small herbs, mostly hispid or lanate, very rarely glabrous; leaves distinctly cordate or three-lobed or palmately 5—7-lobed, rarely oblong or lanceolate, hispid or villose or green above and white-lanate beneath, very rarely glabrous; flowers

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¹) The sectional name *Pharbitis* was already used by GRISEBACH, Fl. Brit. West Indian Isl. (1864) p. 473.

mostly showy; sepals lanceolate or linear, hirsute, very rarely glabrous; corolla mostly reddish, funnel-shaped or rarely tubular, subentire; seeds glabrous or shortly arachnoid.

This section includes:

a. *Cephalanthae* CHOISY emend. HALL. f., l. c. p. 131. Flowers in dense capitate, pedunculate inflorescences; outer bracts mostly large, involucrant.

b. *Chorisanthae* HALL. f., l. c. p. 135. Flowers axillary, solitary or in lax dichasia, rarely aggregate; leaves distinctly cordate or three-lobed or palmately 5-lobed, never oblong or lanceolate.

Sect. 4. *Batatas* (CHOISY) HALL. f., l. c. p. 138[1]). Leaves petiolate, distinctly cordate or pandurate or three-lobed or palmately 5-lobed, glabrous, or appressed-hairy; flowers mostly small, axillary, in long- or short-pedunculate umbellate cymes, rarely solitary; flower buds conical, mostly very acute; sepals oblong, subcoriaceous, mostly lanceolate, very acute with ciliate margins, further glabrous, often attenuate from a stiff pale base into a herbaceous green, recurved acumen, rarely obtuse or entirely glabrous; corolla funnel-shaped, entire, pink or white, 1.5—5 cm long, glabrous; ovary mostly hirsute; seeds glabrous.

Sect. 5. *Leiocalyx* HALL. f., l. c. p. 139. Plants mostly entirely glabrous, rarely with hairy stems, more rarely with hairy leaves, most rarely with hairy sepals; leaves mostly petiolate, their form very various; flowers pedunculate, axillary, solitary or in subumbellate dichasia; sepals very various, mostly oblong or lanceolate, often verrucose or cristate on the back; corolla mostly bright red or purple, rarely white, glabrous or very rarely farinose or pubescent without, mostly subentire; seeds mostly entirely glabrous, rarely velutinous or with bearded outer edges.

Sect. 6. *Eriospermum* HALL. f., l. c. p. 149. Perennial plants, very variable in habit, pubescence, leaves and flowers; flower buds rarely acute, mostly obtuse, very often globular; sepals mostly obtuse, often orbicular, convex, rarely flat or acute; seeds with long-bearded edges, further glabrous or rarely the whole surface villose.

Calonyction and *Quamoclit* are treated by HALLIER l. c. as separate genera.

In 1922 in the Mededeelingen van 's Rijks Herbarium, Leiden, No. 46, p. 19 and 20, HALLIER mentions *Calonyction* and *Quamoclit* as subsections of the section *Leiocalyx*: *Ipomoea* sect. *Leiocalyx* subsect.

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[1]) The sectional name *Batatas* was already used by GRISEBACH, Fl. Brit. West Indian Isl. (1864) p. 468.

Calonyction (CHOISY) HALL. f., l. c. p. 19 and sect. *Leiocalyx* subsect. *Quamoclit* (MOENCH) HALL. f., l. c. p. 20.

BAKER & RENDLE in their revision of the Convolvulaceae in THISELTON-DYER's Flora of Tropical Africa IV, 2 (1905) have partly accepted HALLIER's subdivision. They have introduced, however, some alterations and have added some new sections. The name *Pharbitis* (CHOISY) HALL. f. has been suppressed and instead of it there occur three sections, viz. sect. *Involucratae* BAKER & RENDLE, l. c. p. 130, containing part of HALLIER's subsection *Cephalanthae,* with species possessing flowers in a dense head subtended by a leafy boat-shaped bract; sect. *Cephalanthae* l. c. p. 131 identic with HALLIER's subsection, with the exception of the *Involucratae,* and sect. *Chorisanthae* l. c. p. 131 identic with HALLIER's subsection *Chorisanthae.* The sections *Batatas* and *Leiocalyx* have been united under the name, though youngest name, of the latter (l. c. p. 132). New sections created by BAKER & RENDLE are the *Xerophyta* l. c. p. 135, the *Argyrophyllae* l. c. p. 135, the *Floriferae* l. c. p. 135 and *Phyllocalyx* l. c. p. 135. Of these the species of the *Xerophyta* and the *Argyrophyllae* were inserted by HALLIER in *Eriospermum*; the section *Floriferae* consists of species which HALLIER placed partly in the section *Eriospermum,* partly in the genus *Rivea.* The section *Phyllocalyx* contains two species, both placed by HALLIER in *Leiocalyx.*

The arrangement of the species in the present paper is in accordance with that of HALLIER.

I must emphasize that some of the sectional names used by HALLIER are not quite in accordance with the principles of priority. In an eventual monographical treatment of the genus one has to take into account the manner in which several authors before HALLIER have tried to subdivide the large and difficult genus (CHOISY, BENTHAM, CLARKE, MEISSNER, PETER, HOUSE and several others).

Key to the species.

1a. Sepals distinctly awned at or below the top; awn straight or curved. Corolla salver-shaped with long and narrow tube. Stamens mostly exserted . . 41

b. Sepals obtuse, acute or acuminate, sometimes mucronulate but never distinctly awned. Corolla mostly funnel-shaped or campanulate, sometimes salver-shaped. Stamens mostly included, rarely exserted 2

2a. Corolla white, large, 10 cm long or longer, salver-shaped with long and narrow tube. Sepals obtuse. Seeds hairy. Large woody twiners . . . 39

b. Corolla large, medium-sized or small, mostly funnel-shaped or campanulate, 10 cm long or mostly shorter; rarely salver-shaped, in the latter case never longer than 7 cm. Sepals obtuse, acute or acuminate. Seeds hairy or glabrous. Herbaceous or sometimes woody twiners, or prostrate or erect plants . 3

3a. Sepals entirely glabrous (sometimes muricated) 19

b. Sepals not entirely glabrous 4

4a. Flowers sessile in the leaf-axils or very shortly pedunculate. Corolla less than 1.5 cm long 5

b. Peduncle mostly longer. Corolla 1.5 cm or mostly longer 7

5a. Erect or ascending herb. Leaves acute at the base, attenuate into the petiole, narrow-elliptic, elliptic-oblong, elliptic-obovate or oblanceolate, margin entire, undulate to coarsely dentate or irregularly pinnatifid. Flowers solitary in the leaf-axils; corolla glabrous, 1¼ cm long . . . **3. I. polymorpha**

b. Twining or prostrate herbs. Leaves with cordate base. Corolla with pilose midpetaline bands without 6

6a. Ovary and capsule hairy. Pedicels very short. Outer sepals linear-acuminate from an ovate base. Corolla pink or purple, 7—9 mm long . **1. I. hispida**

b. Ovary and capsule glabrous. Pedicels longer. Outer sepals linear-acuminate from a broad-triangular, slightly cordate to truncate base. Corolla white, 9—13 mm long . . . . **2. I. plebeia**

7a. Flowers aggregate at the end of the peduncle, involucrate by large bracts . 16

b. Flowers whether of not aggregate at the end of the peduncle, not distinctly involucrate 8

8a. Hairs of the sepals stellate (see key n. 37a) . . . . **32. I. asterophora**

b. Hairs of the sepals not stellate 9

9a. Sepals 4 mm long or less (outer sepals not orbicular) (see key n. 31b) . . . . **14. I. obscura**

b. Sepals 5 mm long or longer 10

10a. Outer sepals orbicular, broadly rounded at the top 38

b. Outer sepals narrower, mostly acute, sometimes subobtuse 11

11a. Corolla glabrous without. Seeds puberulent or glabrous 12

b. Corolla with sericeous midpetaline bands. Seeds villose . . **34. I. fragrans**

12a. Sepals long-attenuate or long and linear-acuminate at the top, herbaceous . 13

b. Sepals acute or subobtuse, sometimes mucronulate, not long-attenuate towards the top, herbaceous, membranaceous or coriaceous 15

13a. Sepals nearly linear, attenuate into an acute point, hirsute at the base, glabrous at the top, 8—15 mm long. Corolla not exceeding 3 cm. Stems and peduncles thin, filiform . . . . **7. I. Decaisnei**

b. Sepals lanceolate or linear-lanceolate at the base with long and linear acumen or long-attenuate. Corolla larger, 5—8 cm long. Stems and peduncles thicker 14

14a. Outer sepals lanceolate at the base with long and linear acumen, patently hirsute in the basal portion, 17—25 mm long; corolla 5—6 cm long . . . . **5. I. Nil**

b. Outer sepals lanceolate to broad-lanceolate at the base, gradually attenuate towards the top; hairs of the sepals mostly appressed, not patent (or sepals entirely glabrous); sepals 14—22 mm long, corolla 5—8 cm long . . . . **6. I. congesta**

15a. Outer sepals herbaceous, oblong, acute, with bristly patent hairs in the basal portion, 10—15 mm long; corolla mostly purple-blue with reddish midpetaline bands, the tube much paler to white; length of corolla 5—6 cm . . . . **4. I. purpurea**

b. Sepals coriaceous or membranaceous, not patently hirsute in the basal portion; margins of sepals fimbriate; corolla smaller 17

16a. Leaves palmately divided nearly to the base. Bracts foliaceous. Outer sepals lanceolate, acute. Corolla funnel-shaped, white . . . **8. I. Pes-tigridis**

b. Leaves entire. Bracts boat-shaped. Outer sepals oblong-spathulate to oblong, obtuse. Corolla salver-shaped, pink or purple . . . . . . **9. I. pileata**

17a. Plant cultivated for its edible subterraneous tubers, sometimes escaped from culture. Stems mostly prostrate, thick. Leaves broad-ovate to orbicular in outline, cordate or truncate at the base, entire or angular to palmately 3—5 (—7)-lobed; corolla pale violet, 3—4.5 cm long . . . **12. I. Batatas**

b. Stems mostly twining, thinner. No tubers. Corolla pink or red-purple . 18

18a. Corolla small, 18—20 mm long; flowers aggregate, branches of the cyme very short. Peduncles rather stout. Sepals mucronulate . . **10. I. triloba**

b. Corolla larger, to 3 cm long; inflorescences lax, branches of the cyme longer. Peduncles thinner. Mucro of the sepals longer . . . **11. I. commutata**

19a. Outer sepals with lanceolate to broad-lanceolate base, long and gradually attenuate towards the top; length of sepals 14 mm or more (see key n. 14b) . . . . **6. I. congesta**

b. Sepals not so long and gradually attenuate towards the top 20

20a. Ovary densely to very sparsely hairy (see key n. 17a) . . **12. I. Batatas**

b. Ovary entirely glabrous 21

21a. Stamens exserted 33

b. Stamens included 22

22a. Leaves palmately lobed to palmately compound 34

b. Leaves not palmately cut 23

23a. Corolla 7 cm high or more. At least the inner orbicular sepals 7 mm long or longer 37

b. Corolla smaller 24

24a. Large woody, glabrous twiner; stems stout; flowers in axillary panicles, the primary branches racemose, the ultimate partial inflorescences cymose. Leaves large, ovate, base slightly cordate to truncate; lateral nerves 11—14 on each side of midrib. Outer sepals broadly ovate, obtuse, c. 3.5—4.5 mm long, inner ones orbicular 4.5—5 mm long; corolla tubular to funnel-shaped, c. 3—3.5 cm long. Seeds with long silky hairs . . . **37. I. sumatrana**

b. Smaller mostly herbaceous twiners with thinner stems or prostrate plants; glabrous or hairy. Flowers in few- or several-flowered axillary cymes or solitary in the leaf axils 25

25a. Corolla small, up to 2.5 cm long 31

b. Corolla 3 cm long or longer 26

26a. Plants of marshy places or aquatic with trailing and rooting or floating, thick, soft and fistulose or spongy stems. Leaves herbaceous with truncate, cordate, sagittate or hastate base. Pedicels 2—6.5 cm long; sepals equal or the outer ones a little shorter; outer sepals ovate-oblong, 7—8 mm long; corolla pink or pale-lilac, often with a purple eye, rarely white, 3—5 cm long; seeds pubescent . . . . **18. I. aquatica**

b. Terrestrial plants with twining or trailing stems, not as in 26a . . . 27

27a. Stems trailing, rarely twining, mostly thick. Leaves subcoriaceous or fleshy, mostly obtuse to broadly rounded or emarginate at the apex. No subterraneous tubers [1]) 28

b. Stems mostly twining, thinner. Leaves mostly herbaceous, attenuate towards the apex, acute or acuminate, sometimes obtuse 30

28a. Corolla white or yellowish. Sepals slightly unequal, oblong, acutish or obtuse, not muricated on the back, inner sepals 10—15 mm long. Leaves small, fleshy, very variable, linear, lanceolate, oblong or ovate, obtuse or emarginate at the apex, obtuse or truncate or shallowly cordate at the base, or leaves 3—5-lobed . . . . **21. I. stolonifera**

b. Corolla pink or red purple. Leaves larger, subcoriaceous, kidney-shaped, orbicular, elliptic, ovate or quadrangular to oblong, broadly rounded or emarginate at the apex 29

29a. Leaves kidney-shaped with broadly rounded apex; base cordate. Sepals unequal, the outer ones shorter, all elliptic-oblong . . **20. I. asarifolia**

b. Leaves orbicular, elliptic, ovate or quadrangular to oblong, emarginate at the apex; base truncate, rounded, subcuneate or sometimes shallowly cordate. Sepals subequal or the outer ones shorter; outer sepals ovate to elliptic, interior ones broader . . . . **19. I. Pes-caprae**

30a. Corolla yellow. Sepals oblong or ovate-oblong, obtuse to truncate or slightly emarginate at the apex, subequal, 5—6.5 mm long. Seeds tomentose . . . . **15. I. ochroleucea**

b. Corolla pink or purple. Seeds puberulent or glabrous 32

31a. Peduncles stout, thickened towards the top, often applanate. Pedicels ¾—1 cm long. Outer sepals verruculose, elliptic-oblong, obtuse, minutely mucronate, 4—6 mm long. Corolla pale lilac or nearly white, with purple centre. Seeds short-tomentose and with longer arachnoid hairs along the edges . . . . **17. I. maxima**

b. Peduncles thin, filiform, not thickened towards the top, not applanate. Pedicels 1—2 cm long. Outer sepals verruculose, ovate, acutish, mucronulate, 3—4 mm long. Corolla white or pale yellow with a purple eye. Seeds puberulent . . . . **14. I. obscura**

32a. Peduncles fistulose. Sepals subequal, 4.5—6 mm long, not very concave, narrow-triangular to ovate-lanceolate, acute, with white margins, carinate. Corolla red-purple with a white tube, 4—6 cm long; capsule ovoid; seeds puberulent. Leaf margin entire . . . . **22. I. violacea**

b. Peduncles thinner. Sepals slightly unequal, outer ones 6—10 mm, inner ones 8—12 mm, concave, outer ones oblong-elliptic or elliptic, acute or obtuse, inner ones elliptic to orbicular, obtuse, not carinate, margins not white. Corolla pink or pink-purple, often darker near base inside, 3—4.5 cm long; capsule depressed-globose; seeds glabrous. Leaf margin entire, or undulate to angular or 3-lobed . . . . **13. I. gracilis**

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[1]) Stems trailing, rarely twining, thick. Leaves herbaceous, attenuate towards an acute or obtuse apex; leaf margin entire or angular (or lobed). Subterraneous tubers. See **12. I. Batatas.**

33a. Leaves ovate to orbicular, entire. Corolla funnel-shaped, yellow. Outer sepals not very concave, ovate to oblong, subacute, 5—6 mm long. Pedicels thick . . . . **16. I. stibaropoda**

b. Leaves deeply palmately lobed. Corolla more or less salver-shaped, red or red-purple. Outer sepals very concave, elliptic or ovate-elliptic, obtuse, 7—9 mm long. Pedicels thinner . . . . **33. I. Horsfalliae**

34a. Segments of the leaves entire 36

b. Segments of the leaves dentate to coarsely and irregularly pinnatifid . 35

35a. Corolla less than 1.5 cm long. Sepals c. 4 mm long, the back muricated . . . . **24. I. coptica**

b. Corolla c. 5 cm long. Sepals 6—10 mm long, the back carinate and muricated . . . . **25. I. diversifolia**

36a. Leaves palmately cut to the base. Pseudostipules (small leaves of the axillary shoot) often present. Sepals 4—6 mm long, not very concave, the exterior ones ovate, obtuse or acutish, mucronulate, the interior ones broader, obtuse, mucronulate. Stems and peduncles rather thin . . **23. I. cairica**

b. Leaves palmately lobed to or mostly beyond the middle, not to the base[1]). Pseudostipules wanting. Sepals 6—11 mm long, concave, all orbicular or the exterior ones oblong to broad-elliptic, obtuse. Stems and peduncles stout. Plant entirely glabrous or very sparsely pubescent with simple hairs (in the closely related *32. I. asterophora* with stellate hairs) . . **31. I. digitata**

37a. Leaves ovate[2]), with 3—4 nerves on each side of the midrib. Plant more or less tomentose with stellate hairs, often glabrescent or *nearly* glabrous. Corolla c. 7 cm long . . . . **32. I. asterophora**

b. Leaves ovate, with 10—15 nerves on each side of the midrib. Plant glabrous or pubescent with simple hairs. Corolla up to 10 cm long . . **35. I. illustris**

38a. Outer sepals 7—10 mm long, occasionally pubescent, mostly glabrous. Corolla glabrous. Ovary glabrous . . . . **35. I. illustris**

b. Outer sepals 5—6 mm long, puberulent. Corolla with puberulent tube and midpetaline bands. Ovary puberulent . . . . **36. I. crassicaulis**

39a. Stamens inserted near the mouth of the corolla tube. Sepals subequal or outer slightly longer than inner, 12—18 mm long . . . . **38. I. aculeata**

b. Stamens inserted near the base of the corolla tube. Outer sepals slightly or much shorter than inner ones 40

40a. Sepals very unequal; outer sepals much shorter than inner ones. Leaves mostly (3—)5(—7) lobed, rarely entire. Corolla white with reddish midpetaline bands, 11—14 cm long. Stamens exserted . . **40. I. trichosperma**

b. Outer sepals only slightly shorter than inner ones. Leaves mostly entire. Corolla white with greenish bands, 9—12 cm long. Stamens included . . . . **39. I. tuba**

41a. Corolla rather small, scarlet, rarely white. Outer sepals 2—4.5 mm long (awn exclusive), inner ones 3—6 mm (awn exclusive) 43

b. Corolla large, white or purple. Outer sepals 5—10 mm long (awn exclusive), inner ones 7—15 mm (awn exclusive) 42

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[1]) See also **12. I. Batatas** and **21. I. stolonifera.**

[2]) Leaves linear. See **26. I. graminea.**

42a. Corolla salver-shaped with subrotate limb, white; the tube not or slightly widened above, 7—12 cm long . . . . **27. I. alba**
b. Corolla salver-shaped with funnel-shaped to rotate limb, lilac; the tube distinctly widened above, 3—6 cm long . . . . . . **28. I. muricata**
43a. Leaves pinnately partite into numerous linear or filiform segments . . . . **30. I. Quamoclit**
b. Leaves not pinnately partite, ovate to orbicular, cordate at the base, the margin entire or lobed . . . . **29. I. angulata**

Section 1. **Calycanthemum** (Klotzsch) Hall. f.

Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 123; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 510 (*Calycanthum*); Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 129 — genus *Calycanthemum* Klotzsch in Peters, Naturw. Reise Mossamb., Bot. I (1861) p. 243, t. 40.

Description see p. 483.

1. **Ipomoea hispida** (Vahl) R. & Sch., Syst. IV (1819) p. 238; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 123; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 510; Merrill & Rolfe in Philipp. Journ. Sc. III (1908) p. 122; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 113; Koorders, Exk. fl. Java III (1912) p. 116; Koorders-Schum., Syst. Verz. I (1910—13) Conv. p. 4; Gamble, Fl. Pres. Madras V (1923) p. 915; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 366; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 523 — *Convolvulus hispidus* Vahl, Symb. Bot. III (1794) p. 29 — *Ipomoea eriocarpa* R. Br., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 484; Choisy in DC., Prodr. IX (1845) p. 369; Benth., Fl. Austr. IV (1869) p. 426; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 204; Watt, Dict. Econ. Prod. India IV (1890) p. 485; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 105; Trimen, Handb. Fl. Ceyl. III (1895) p. 217; Manson Bailey, Queensl. Fl. IV (1901) p. 1066; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 136; Gagnep. & Courch. in Lec., Fl. Indo-Chine IV (1915) p. 245 — *I. sessiliflora* Roth, Nov. Pl. Spec. (1821) p. 116; Wight, Icon. I (1840) t. 169; Choisy in DC., Prodr. IX (1845) p. 366; Zoll., Syst. Verz. 2. Heft (1854) p. 129; Miq., Fl. Ned. Ind. II (1857) p. 610 — *Convolvulus eriocarpus* (R. Br.) Spreng., Syst. I (1825) p. 598 — *C. sessiliflorus* (Roth) Spreng., Syst. I (1825) p. 599 — *Ipomoea Horsfieldiana* Miq., Fl. Ned. Ind. II (1857) p. 611.

Herbaceous; stems twining or prostrate, 1—2 m long (Backer), slender, terete, slightly striate, retrorsely to patently pilose. Leaves petiolate; petiole shorter than or as long as the blade, thin, pilose like the stems, 0.8—8 cm long; blade commonly lanceolate to oblong-lanceolate or linear-lanceolate, sometimes broader, lanceolate-ovate to ovate, long-attenuate to acuminate towards the apex, with acute or obtuse mucronulate point, the base cordate with rounded sinus and rounded auricles; sparsely pilose on both surfaces or more densely beneath; nerves 7—8 on each side of the midrib; narrow leaves 2.5—6 × 0.5—1.5, broader ones 2.5—9 × 1.5—5.5 cm. Inflorescences axillary, sessile or with a very short peduncle, always much shorter than the petiole, cymosely 1—3- or sometimes more-flowered; peduncle rather densely pilose; flowers sessile or pedicels very short, to 3 mm; bracts pilose, linear or lanceolate, lower ones 3—8 mm, upper ones shorter; sepals pilose, linear-acuminate from an ovate base, the inner ones slightly narrower than the outer, all of about the same length, 7—8 mm; corolla open only in the morning (Lörzing), little exceeding the sepals, 7—9 mm long, tubular to funnel-shaped, with 5 pilose midpetaline bands, pink or purple, darker inside, the tube and the midpetaline bands paler without (Backer); stamens and style included; stamens inserted near the corolla base, unequal; filaments filiform, glabrous with exception of the somewhat dilated base; anthers elliptic, sagittate; ovary with long hairs; style filiform, hairy at the base; stigma biglobular, papillose; disk annular; capsule shorter than the sepals, about 5—6 mm in diam., broad-ovoid to globular, hairy, crowned by the hairy base of the style, opening by 4 valves, 2-celled; seeds 4, c. 2.5 mm long, glabrous, minutely reticulate.

Sumatra, without locality, Korthals 131 (34) (L); East Coast, Karolands, near Tandjoeng, W. S. W. of Sinaboeng, Lörzing 9001, May 1922 (B); Karo upland, near Koeta bangoen, W. of Kabandjahe, Galoengi 269, Apr. 1919 (B); Tapanoeli, Toba, Haoenatas, Ouwehand 84, March 1896 (B).

Java. From West to East Java, at low and medium altitudes, on periodically dry soil, in hedges, thickets, grasslands, in general rather rare (Backer). Without locality, Kuhl & van Hasselt 65 (L); Reinwardt 36 (L); Batavia, Tandjong Priok, Backer 35450, May 1904 (B); Kebajoran, Backer 35449, July 1904 (B); Buitenzorg, Buitenzorg, introduced from British India, Backer 31953 (B); Cheribon, between Cheribon and Linggadjati, Backer 4770, Oct. 1912 (B); Semarang, Semarang, De Visser Smits s. n., Aug. 1916 (B); id., Docters van Leeuwen s. n., Apr. 1910 (B); Sepakoeng, Koorders 35785 β, May 1899 (B); Djapara-Rembang, Koedoes, coll. unknown, s. n., Oct. 1924 (Pa); Soerakarta, Horsfield s. n. (L; U, *type of I. Horsfieldiana* Miq.); Madioen, Madioen, Wisse s. n. (B); Ngawi, Soeradji 10, May 1918 (B); Ngebel, Koorders 23164 β, May 1896 (B); Kediri, Kediri, Backer 11344, Febr. 1914 (B); Bendo Redjo, W.slope of G. Keloed, Leefmans s. n. (B); Soerabaja, Wonokromo, Dorgelo 763, July 1922 (Pa); Malang, Malang, Wisse 221, June 1920 (B); Kepandjen, Ismail 23 (B); Tengger, Bodo, Mousset 285, March 1912 (B); Kepoeh near Pasoeroean, Backer 8306, 24190, June 1913 and 1918 (B); Besoeki, Djatiroto, Backer 8108, May 1919 (B); Asem Bagoes, Backer 8204, May 1913 (B); Soembermalang near

Bondowoso, BACKER 13377, Apr. 1914 (B); Madoera, Ketapang daja, BACKER 19893, March 1915 (B); between Rapa and Karang Pinang, BACKER 20097, March 1915 (B); Pamekasan, ZOLLINGER 2232, June 1858 (L).

CELEBES, Celebes and Dependencies, Rogang near Lombasang, BÜNNEMEYER 11495, May 1921 (L).

TIMOR, without locality, SPANOGHE 206 (L).

NEW GUINEA, Papua, Rouna, CARR 12441, May 1935 (L); Port Moresby (according to VON MUELLER, Pap. Pl. IV, 1876, p. 70); id., JESWIET 65, May 1928 (W).

PHILIPPINE ISLANDS, in open grasslands and on and about tali, slopes and hedges, ascending to 1200 m (MERRILL). Without locality, LOHER 6588 (B); Luzon, Prov. of Benguet, Bued River, MERRILL 4270, Oct.—Nov. 1905 (B, L). Also in Ilocos Norte, Bontoc and Pangasinan (MERRILL).

Distribution: Tropical Africa, Madagascar, tropical Asia to North Australia.

Habitat: Grasslands, grassy waysides, thickets, hedges, fields, occasionally in secondary forests; between 1 and 1300 m.

Vernacular names: slawatan (Jav., Java, Madioen, KOORDERS); ojod-ojodan (Java, Malang, ISMAIL).

Use: See WATT l. c. DUTHIE says that the leaves and stems are often eaten as a vegetable.

2. **Ipomoea plebeia** R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 484; BENTH., Fl. Austr. IV (1869) p. 426; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1066 — ? *Convolvulus biflorus* L., Spec. Pl. ed. 2, App. (1763) p. 1668 — ? *Ipomoea biflora* (L.) PERS., Syn. I (1805) p. 183, non R. BR., 1810 (according to HALL. f., 1897); HALL. f. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; KOORDERS, Exk. fl. Java III (1912) p. 117 — *Convolvulus plebeius* (R. BR.) SPRENG., Syst. I (1825) p. 604; CHOISY in DC., Prodr. IX (1845) p. 412 — *Ipomoea timorensis* BL., Bijdr. (1825) p. 711.

Herbaceous; stems twining or prostrate, slender, terete, smooth or slightly striate, patently to retrorsely hairy. Leaves petiolate; petiole slender, shorter to longer than the blade, hairy like the stems, 1—6 cm long; blade ovate, rarely narrower, attenuate to short-acuminate towards the apex with an acute or obtusish mucronulate point, cordate at the base with a broad or narrow rounded sinus and broad obtuse auricles, sparsely hairy on both sides; nerves c. 5—7 on each side of the midrib; length of the blade 3—8 cm, width of the blade 1.5—6 cm, rarely narrower. Inflorescences axillary, sessile or with a short peduncle always very much shorter than the petiole, 1 or 2, sometimes 3-flowered; peduncle with patent hairs; flowers with slender, hairy, 5—7 mm long pedicels; bracts small, c. 2—2.5 mm; sepals hairy, two outer ones long and linear-acuminate from a broad-triangular slightly cordate to truncate base, third sepal oblique, base of fourth and fifth sepal much narrower; sepals equal in length, 7—8 mm long; corolla little exceeding the sepals, c. 9 (11—13, Backer) mm long, tubular to funnel-shaped, white, the midpetaline bands pilose towards the top; stamens included, red (Mrs. Rensch), inserted near the corolla base, unequal; filaments filiform, glabrous, with exception of the dilated base; anthers elliptic, sagittate; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose, violet (Backer); disk annular; capsule little shorter than the sepals, about 7 mm high, broad-ovoid to globose, glabrous, crowned by the base of the style, opening by 4 valves, 2-celled; seeds 4, c. 4—4.5 mm long, shortly brown to grey-tomentose and sometimes with longer white hairs along the margins.

Java, Priangan, Soekaboemi, dust heap, Backer 14793, July 1914 (B); Besoeki, Sitoebondo, Backer 24627, June 1918 (B); Madoera, Kangean Islands, Sapeken, Backer 28570, Apr. 1919 (B); Saèboes, Backer 29086, Apr. 1919 (B).

Celebes, Celebes and Dependencies, Kalosi, Kjellberg 4000, May 1929 (B).

Lombok, Rindjani, S. S. E. side, Iwela near Pringgabaja, Elbert 1987, June 1909 (L).

Soembawa, Wawo, Mrs. Rensch 899, June 1927 (B).

Timor, without locality, coll. unknown, n. 290 (L, *type of I. timorensis* Bl.); Reinwardt s.n. (L, mixed with *I. Decaisnei* van Ooststr.); Reinwardt 36, 1332 (L); Teysmann s.n. (B); S. Middle Timor, Nipol, Mrs. Walsh 473, Apr. 1929 (B).

Distribution: Malay Archipelago, Queensland.

Habitat: Grasslands, dry thickets; between 1 and 600 m.

Remarks. Hallier in Bull. Herb. Boiss. V (1897) p. 379 considers *I. timorensis* Bl., 1825 (= *I. plebeia* R. Br., 1810) as a synonym of *I. biflora* (L.) Pers. *I. biflora* (L.) Pers. was based by Persoon on *Convolvulus biflorus* L., a Chinese species described by Linnaeus in the Appendix to the second edition of his Species Plantarum, 1763. The name *I. biflora* consequently should have priority. As it is in my opinion somewhat doubtful, whether both species are identic, I prefer to use the name *I. plebeia* R. Br., 1810, for the Malaysian specimens.

3. **Ipomoea polymorpha** R. & Sch., Syst. IV (1819) p. 254; Merrill in Philipp. Journ. Sc. XIV (1919) p. 450; id., Enum. Philipp. Fl. Pl. III (1923) p. 367 — *I. heterophylla* R. Br., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 487, non Ortega, 1800; Choisy in DC., Prodr. IX (1845) p. 354; Benth., Fl. Austr. IV (1869) p. 426; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 125; Manson Bailey, Queensl. Fl. IV (1901) p. 1066; Koorders, Exk. fl. Java III (1912) p. 121; Gagnep. &

COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 267; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 523 — *Convolvulus Brownii* SPRENG., Syst. I (1825) p. 612, non l. c. p. 590 — *C. Robertianus* SPRENG., Syst. V (1828) p. 192 — *Ipomoea pumila* SPANOGHE in Linnaea XV (1841) p. 341; CHOISY in DC., Prodr. IX (1845) p. 357; MIQ., Fl. Ned. Ind. II (1857) p. 604; FORBES, Wander., Germ. ed. II (1886) p. 222 — *Convolvulus nolanaeflorus* ZIPP. ex SPANOGHE l. c. in syn. — *C. defloratus* CHOISY in ZOLL., Syst. Verz. 2. Heft (1854) p. 130, 132; MIQ., Fl. Ned. Ind. II (1857) p. 623.

A herbaceous annual, 8—60 cm high; stems terete, erect, simple, or branched from the base, branches patent to ascending, the young parts densely pilose, the adult parts less densely pilose, glabrescent to glabrous. Leaves petiolate; petiole shorter than the blade, sparsely pilose like the stems, 0.5—3 cm long; blade narrow-elliptic, elliptic-oblong, elliptic-obovate to oblanceolate, mostly attenuate towards both ends, the apex acute or obtuse to rounded, minutely mucronate, the base acute, attenuate into the petiole; blade glabrous or sparsely pilose near the base; leaf margin entire, undulate or coarsely dentate, with a few large teeth, occasionally irregularly pinnatifid, with few segments to lyrate with large, ovate or elliptic, entire or coarsely dentate terminal segment and small triangular to hastate basal ones; lateral nerves 5—6, straightly ascending; length of blade 1.5—7.5 cm, width of blade 0.5—3 cm. Flowers solitary in the leaf-axils; peduncle and pedicel very short or none; bracts linear-filiform, c. 1 cm long, long-hairy; sepals with distinct midrib, all long-acuminate, long-hairy, the outer ones herbaceous, ovate-lanceolate, entire or with one or two teeth at the margin, the inner ones herbaceous with thin scarious margin, lanceolate, all 8—10 mm long; corolla red-purple, darker inside (BACKER), rarely white, small, tubular-funnel-shaped, c. 1¼ cm long, ¾—1 cm wide, glabrous; stamens and style included; stamens inserted nearly 2 mm above the corolla base; filaments white, unequal, filiform, dilated and hairy at the base; anthers elliptic, nearly 1 mm long in open flower; ovary glabrous; style filiform, glabrous, articulate; capsule globular, glabrous, straw-coloured, shorter than the calyx, 4—6 mm high, 4-valved, 2-celled, 4-seeded; seeds with a mottled brownish or greyish black pubescence, c. 2½—3¼ mm long.

JAVA. In East Java, in the lower parts with strong east monsoon, on hard or stony soil, in sunny localities, especially on fields, grasslands, along waysides, locally frequent (BACKER). Buitenzorg, only cultivated in the Botanic Garden, TEYSMANN 101 (L); Malang, hills S. E. of Bangil, BACKER 37361, Apr. 1929 (Pa); G. Semongkrong, E. of Pasoeroean, BACKER 36543, March 1928 (Pa); id., VAN SLOOTEN 2430, Apr. 1931 (B); Besoeki, ZOLLINGER 2822, Apr. 1845 (B); between Badjoel mati and Batoe dodol, ZOLLINGER 2821, *type of Convolvulus defloratus* CHOISY (according to ZOLLINGER); Banjoepoetih near Asem Bagoes, BEGUIN 162, March 1922 (B); Balalean, E. of Soemberwaroe, CLASON-LAARMAN G 68, Jan. 1932 (B); Madoera, E. of Bangkalan, BACKER 18953, Febr. 1915 (B, L, U, W); Kwanjar, BACKER 19204, Febr. 1915 (B); Sapoeloe, BACKER 19434, Febr. 1915 (B); Sampang, BACKER 19666, March 1915 (B); id., hills, RANT s.n., Dec. 1924 (B); Ketapang daja, BACKER 19872, March 1915 (B); Rapa, BACKER 20232, March 1915 (B); hills S.W. of Tamberoe, BACKER 20530, March 1915 (B); Kamal, BEUMÉE A 876, Febr. 1931 (B); Kangean Islands, Kangean, N. of Ardjasa, BACKER 26909, March 1919 (B).

SOEMBA, Nabeso, IBOET 87, March 1925 (B).

FLORES, between Boa Wae and Deroe, HORST 41, Nov. 1921 (B).

TIMOR, without exact locality, SPANOGHE, numbered Icon. 45 (L, *type of I. pumila* SPAN.); SPANOGHE 72 (L); id. s.n. (U); TEYSMANN 5091 H. B. (B, U); ZIPPELIUS 73 (88/1 and 88/2) and s.n. (L, *type of Convolvulus nolanaeflorus* ZIPP.).

PHILIPPINE ISLANDS, in dry open places at low altitudes (MERRILL). Luzon, Ilocos Norte, Union (MERRILL).

Distribution: Africa (Abyssinia), British India (?), Formosa (MERRILL), Java, Lesser Sunda Islands, Philippines, N.E. Australia.

Habitat: Grasslands, grassy waysides, fields, sandy plains; between 1 and 100 m.

Vernacular name: camarin (Philippines, Ilóko language, MERRILL).

Section 2. **Dasychaetia** HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 130; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 130.

Description see p. 483.

Not represented in Malaysia.

Section 3. **Pharbitis** (CHOISY) GRISEB.

GRISEB., Fl. Brit. West Indian Isl. (1864) p. 473; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 131; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511 — genus *Pharbitis* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 438 — *Ipomoea* subgenus *Pharbitis* (CHOISY) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 199.

Description see p. 483.

Subsection 1. *Chorisanthae* HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 135; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511 (*Chorisantheae*); BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 131.

Description see p. 484.

4. **Ipomoea purpurea** (L.) ROTH, Bot. Abh. (1787) p. 27; LAMK., Tabl. Encycl. I (1791) p. 466; ROTH, Catal. Bot. I (1797) p. 36; BENTH., Fl. Austr. IV (1869) p. 417; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 200; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 137; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1059; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 117; KOORDERS, Exk. fl. Java III (1912) p. 120; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 367 — *Convolvulus purpureus* L., Spec. Pl. ed. 2, I (1762) p. 219; CURTIS, Bot. Mag. III (1797) t. 113; id., XXV (1807) t. 1005 (var. *elatior*); id., XLI (1815) t. 1682 (var. *varius*) — *Ipomoea hispida* ZUCC., Cent. Obs. (1806) n. 36 (not seen); id. in ROEM., Collect. (1809) p. 127 (not seen) — *Pharbitis hispida* (ZUCC.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 438; id. in DC., Prodr. IX (1845) p. 341; MIQ., Fl. Ned. Ind. II (1857) p. 594 — *Ph. purpurea* (L.) VOIGT, Hort. Suburb. Calc. (1845) p. 354.

Herbaceous annual. Stems terete, twining, with short hairs mixed with longer retrorse bristles. Leaves petiolate; petiole shorter or longer than the blade, 2—15 cm long, retrorsely hirsute; blade broad-ovate or orbicular in outline, the margin entire or three-lobed; apex short-acuminate, base cordate with broadly rounded auricles; the upper and lower surface of the leaf with short bristly hairs; length of the blade 4—15 cm, width of the blade 2.5—12 cm. Inflorescences axillary, pedunculate, the peduncles shorter or longer than the petiole, with retrorse bristly hairs like the stems, 3—18 cm long; flowers 1—few at the end of the peduncle; pedicels with short hairs or with a few bristles, 8—15 mm long, recurved in flower-bud, afterwards erect, finally recurved again, in fruit to 20 mm long and thickened towards the apex; bracts linear or filiform, to 7 mm long; sepals about equal in length, the three outer ones herbaceous or the third one with a narrow scarious margin, oblong, slightly narrowed at the base, acute at the apex, with bristly, patent hairs in the basal portion, glabrous towards the apex; the two inner ones herbaceous with narrow scarious margins, linear-oblong to linear, acute at the apex, with a few bristly hairs near the base, further glabrous; all sepals c. 10—15 mm long, in fruit to 20 mm; corolla funnel-shaped, glabrous, the limb inside purple-blue with reddish midpetaline areas, outside often paler, the tube much paler to white; length of corolla 5—6 cm, width of limb 6 cm; stamens unequal, included, inserted about 6—7 mm above the base of the corolla; filaments filiform, white, the base with long white hairs; anthers oblong, sagittate; ovary glabrous, 3-celled; style filiform, glabrous; stigma 3-globular, papillose; disk pale-yellow, low, annular, slightly 5-lobed; capsule globular, glabrous, 3-celled, with thin straw-coloured wall, 6 or less-seeded; seeds glabrous or sparsely pilose at the hilum.

Java, Buitenzorg, Buitenzorg, cult. in the Botanic Garden, 4106 HB and 4107 HB (B).

Philippine Islands. Occasionally cultivated in Manila and other towns for ornamental purposes; but showing no tendency to become naturalized (Merrill).

Distribution: Originally in America from New Mexico and Virginia as far south as Argentina and Uruguay.

Vernacular names: morning glory; dagschoone, dagbloem, purperwinde (Dutch).

Use: Cultivated in gardens for ornamental purposes.

5. **Ipomoea Nil** (L.) Roth, Cat. bot. I (1797) p. 36; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 136; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; id. in Bull. Herb. Boiss. V (1897) p. 380; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 511; Koorders, Exk. fl. Java III (1912) p. 120; Koorders-Schum., Syst. Verz. I (1910—13) Conv. p. 5 — *Convolvulus Nil* L., Spec. Pl., ed. 2 (1762) p. 219; Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 62; id., Spec. Blanc. (1918) p. 322 — *Ipomoea scabra* Forsk., Fl. Aegypt.-Arab. (1775) p. 44; Hall. f. in Meded. Rijksherb. Leiden 46 (1922) p. 17 — *I. setosa* Bl., Bijdr. (1825) p. 714; Spanoghe in Linnaea XV (1841) p. 340 — *Pharbitis Nil* (L.) Choisy in Mém. Soc. Phys. Genève VI (1833) p. 439; Decaisne, Herb. Timor. (1835) p. 61; Spanoghe in Linnaea XV (1841) p. 338; Choisy in DC., Prodr. IX (1845) p. 343 excl. var. *diversifolia* Choisy; Zoll., Syst. Verz. 2. Heft (1854) p. 128; Miq., Fl. Ned. Ind. II (1857) p. 595 excl. var. *diversifolia* Choisy; id., Suppl. (1860) p. 234 — *Ipomoea trichocalyx* Steud., Nom., ed. 2, I (1840) p. 819, non Don; Choisy in DC., Prodr. IX (1845) p. 370; Miq., Fl. Ned. Ind. II (1857) p. 611; Forbes, Wander., Germ. ed. II (1886) p. 222 — *I. Nil* (L.) Roth var. *setosa* (Bl.) Boerl., Handl. Fl. Ned. Ind. II (1899) p. 511.

Herbaceous annual or perennial (Hallier); stems twining or sometimes prostrate, terete or angular, retrorsely hirsute; leaves petiolate; petiole shorter to longer than the blade, 3—16 cm long, retrorsely hirsute; blade broad-ovate to orbicular in outline, the margin entire or three-lobed, the middle lobe broad-ovate, ovate or oblong, acuminate at the apex, generally not contracted at the base, the lateral lobes oblique-ovate to broadly falcate, acuminate, the base of the leaf broadly cordate; upper and lower surface of the blade with few to many more or less appressed hairs;

length of the blade 4—14 cm, width 3—12 cm. Inflorescences axillary pedunculate, the peduncles thicker than the petioles, terete, angular or applanate, hirsute like the stems, 2.5—12 cm long; flowers one, few or several at the end of the peduncle in a small umbellate cyme; pedicels 5—10 mm long, with retrorse hairs; bracts small, linear to filiform, 5—8 mm long; sepals 17—25, afterwards to 28 mm long, patently hirsute, especially in the basal portion, sometimes the bristly hairs are mixed with shorter and softer ones; outer sepals with lanceolate, inner ones with narrow-lanceolate base, all with a long and linear acumen; corolla funnel-shaped, c. 5—6 cm long, glabrous outside, pale blue or bright blue, afterwards red or reddish purple, rarely entirely white; the tube and limb always paler without; stamens unequal, included, inserted about 7—10 mm above the base of the corolla; filaments filiform, the base with long curled hairs; anthers ovate-oblong, sagittate; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk low, annular. Capsule ovoid to globular, glabrous, mucronate by the base of the style, opening by 3 valves, generally 3-celled; seeds c. 5 mm long, black, grey-puberulent.

MALAY PENINSULA. Often planted and run wild in hedges and waste ground (RIDLEY).

SUMATRA, Atjeh and Dependencies, near Gajö Loeäs, PRINGO ATMODJO 186 (exped. VAN DAALEN), March 1904 (B, L); East Coast, Lake Toba, near Tongging, LÖRZING 8094, Nov. 1920 (B); West Coast, Bt. Tinggi near Mangani, BÜNNEMEYER 3010, June 1918 (B, L); G. Marapi, BÜNNEMEYER 4814, Sept. 1918 (B); Djambi, near Lake of Kerintji, BÜNNEMEYER 8305, Febr. 1920 (B).

JAVA, without locality[1]), KORTHALS 256 (L); KUHL & VAN HASSELT 67 (L); Batavia, Batavia, KOORDERS 41735 β, June 1913 (B); Weltevreden, BACKER 35444, 35448, March and Aug. 1903 (B); Sentiong, BACKER 35447, July 1902 (B); Buitenzorg, cult. in the Botanic Garden, XV. K. B. X. 1; XV. K. B. XI. 7 (B); id., HALLIER D. 196d, June 1893 (L); Magelang, Awoe awoe, JUNGHUHN s. n., May (L); Semarang, Bangkong, DOCTERS VAN LEEUWEN 1214, Jan. 1913 (B); Jogjakarta, near Bedaja, JUNGHUHN 171, May (L); Madioen, Madioen, BACKER 6978, Febr. 1913 (B); Ngebel, KOORDERS 23200 β, May 1896 (B); Soerabaja, Soerabaja, DORGELO 286, Apr. 1922 (Pa); id., BACKER 26684, March 1919 (B); Sekapoeh, DORGELO 3041, Apr. 1924 (Pa); Gresik, DORGELO 3261 and s. n., Febr. 1925 (Pa); hills near Sidajoe, DORGELO 1889, June 1923 (Pa); Besoeki, near Waringin, and M. Arak arak, ZOLLINGER 2768 (according to ZOLLINGER); Idjen plateau near Djampit, BACKER 25095, June 1918 (B); Madoera, Kamal, DORGELO 683, June 1922 (Pa).

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[1]) A specimen in Leiden, without collector's name, numbered 299, is named *Ipomoea setosa* BL. in BLUME's handwriting. It has been identified by HALLIER as *I. Nil* ROTH var. *integrifolia* HALL. f.

CELEBES, Celebes and Dependencies, Lombasang, BÜNNEMEYER 11181, Apr. 1921 (B); id., BÜNNEMEYER 11303, May 1921 (B); Rogang near Lombasang, BÜNNEMEYER 11494, 11495, May 1921 (B); Tanette, BÜNNEMEYER 11745, May 1921 (B); id., BÜNNEMEYER 12525, June 1921 (B); Malino, BÜNNEMEYER 10763, Apr. 1921 (B); Salajar Islands, Bonerate, DOCTERS VAN LEEUWEN 1452, May 1913 (B, U).

LOMBOK, Laboean, ZOLLINGER 987 (according to ZOLLINGER); Rindjani, N. side, Laboean tjarik, ELBERT 568, Apr. 1909 (L); id., N. E. side, Sembaloen plateau, ELBERT 1528, May 1910 (L).

SOEMBAWA, Soembawa besar, Mrs. RENSCH 505, Apr. 1927 (B).

SOEMBA, Laora, IBOET 340, Apr. 1925 (B).

TIMOR, without locality, FORBES 3776 (B); FORBES 4105 (B, L); FORBES 4108 (L); Koepang, BROWN s. n. (L); S. M. Timor, Soë, on limestone, Mrs. WALSH 65, March 1929 (B).

NEW GUINEA, Netherlands New Guinea, Merauke, VERSTEEG 1968, Nov. 1907 (B); Papua, Rouna, CARR 12333, March 1935 (L).

PHILIPPINE ISLANDS, in thickets and waste places at low and medium altitudes (MERRILL). Luzon, prov. of Abra, RAMOS, Bur. of Sc. 7248, Jan.—Febr. 1909 (B); Distr. of Lepanto, BACANI, For. Bur. 15994, Jan. 1909 (B, L); Rizal prov., Manila, MERRILL 5163, Febr. 1906 (L); id., id., MERRILL 286, Febr. 1910 (U); id., id., RAMOS, Bur. of Sc. 12196, Sept. 1910 (L); id., id., MERRILL, Spec. Blanc. 281, Oct. 1913 (B, L).

Distribution: Circumtropical.

Habitat: Waysides, hedges, thickets, grasslands; cultivated and run wild; 1—1300 m.

Vernacular names: aröj djotang bodas (Sund., KOORDERS); teleng (Jav., Java, Madioen, KOORDERS); bulakán, kamokamotíhan (Philippines, Tagálog language, MERRILL).

Remarks. 1. Several authors have interpreted this species as being identic with the North American *Ipomoea hederacea* (L.) JACQ. (*Convolvulus hederaceus* L., Spec. Pl. ed. 1 (1753) p. 154 p.p.; id., ed. 2 (1762) p. 219 p.p.) and have mentioned it under that name¹). See the criticism by HALLIER in Jahrb. Hamb. Wiss. Anst. XVI, 1898, 3. Beih. (1899) p. 42, under *I. hederacea* (L.) JACQ.

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¹) In literature relative to Malaysia and adjacent regions: R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 486; BENTH., Fl. Austr. IV (1869) p. 416; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 199; FORBES, Wander., Germ. ed. II (1886) p. 222; WATT, Dict. Econ. Prod. India IV (1890) p. 485; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 212; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1058; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 159; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 116; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 241; GAMBLE, Fl. Pres. Madras V (1923) p. 917; RIDLEY, Fl. Malay Penins. II (1923) p. 462; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 365.

The true *I. hederacea* is probably now and then cultivated in gardens. I did not see any specimens from Malaysia [1]).

2. *I. limbata* (LINDL.) BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; KOORDERS, Exk. fl. Java III (1912) p. 122 (= *Pharbitis limbata* LINDL. in Journ. Hort. Soc. V (1850) p. 33; MIQ., Fl. Ned. Ind. II (1857) p. 595; *Ph. Nil* (L.) CHOISY var. *limbata* (LINDL.) HOOK. in CURTIS, Bot. Mag. ser. 3, XXIV (1868) pl. 5720) seems to be a cultivated form of *I. Nil*.

6. **Ipomoea congesta** R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 485; CHOISY in DC., Prodr. IX (1845) p. 369; BENTH., Fl. Austr. IV (1869) p. 417; SCHUM. in ENGL., Bot. Jahrb. IX (1887) p. 216; SCHUM. & HOLLRUNG, Fl. Kais. Wilh. Land (1889) p. 114; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 413; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 137; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 515; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1059 — ? *Convolvulus indicus* BURM., Index Univers. Herb. Amb. VII (1755) p. [6] (not seen) — *C. acuminatus* VAHL, Symb. Bot. III (1794) p. 26 — *Ipomoea cathartica* POIR. in LAMK., Encycl., Suppl. IV (1816) p. 633 — *I. acuminata* (VAHL) R. & SCH., Syst. IV (1819) p. 228, non RUIZ & PAVON, 1799; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; id. in Bull. Herb. Boiss. V (1897) p. 381; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511 [2]); KOORDERS, Exk. fl. Java III (1912) p. 120 — *I. amoena* BL., Bijdr. (1825) p. 718 — *Convolvulus congestus* (R. BR.) SPRENG., Syst. I (1825) p. 601 — *Ipomoea cataractae* ENDL., Prodr. Fl. Norf. (1833) p. 53; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1067 — *Pharbitis insularis* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 439; id. in DC., Prodr. IX (1845) p. 341 — *Ipomoea insularis* (CHOISY) STEUD., Nom. ed. 2, I (1840) p. 817; HILLEBR., Fl. Hawaiian Isl. (1888) p. 317 — *Pharbitis cathartica* (POIR.) CHOISY in DC., Prodr. IX (1845) p. 342 — *Ph. acuminata* (VAHL) CHOISY in DC., Prodr. IX (1845) p. 342 — *id.* var. *congesta* CHOISY, l. c. p. 343 — *Ipomoea indica* (BURM.) MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 445; id., Enum. Philipp. Fl. Pl. III (1923) p. 366; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1304.

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[1]) In literature relative to Malaysia it is mentioned by: BL., Bijdr. (1825) p. 710; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; id. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; KOORDERS, Exk. fl. Java III (1912) p. 119. MIQ., Fl. Ned. Ind. II (1857) p. 596 mentions it under the name of *Pharbitis hederacea* (L.) CHOISY.

[2]) Var. *Burckii* BOERL., l. c., based on *Ipomoea Nil* BURCK in Ann. Jard. Bot. Buitenz. X (1891) p. 88 (haud ROTH), is unknown to me.

Herbaceous plant; the stems twining or occasionally prostrate and then sometimes rooting at the nodes, terete or angular, more or less densely retrorsely pilose. Leaves petiolate; petiole shorter to longer than the blade, 2—18 cm long, hairy, with the hairs directed towards the base; blade broad-ovate to orbicular in outline, the margin entire or three-lobed, the middle lobe ovate or oblong, shortly or long-acuminate at the apex, the base not or slightly narrowed, the lateral lobes oblique-ovate to broadly falcate, shortly or long-acuminate, the base of the leaf broadly cordate; lower surface often densely, upper surface less densely pilose with short, soft, appressed hairs, sometimes the lower surface sericeo-tomentose; length of the blade 5—17 cm, width 3.5—16 cm. Inflorescences axillary, pedunculate, the peduncle shorter to much longer than the petiole of the subtending leaf, more or less densely and retrorsely pilose like the stems, (0.5—)4—20 cm long; flowers few to several at the end of the peduncle in a dense umbellate cyme with very short branches; pedicels short, 2—5(—8) mm; bracts linear to filiform, occasionally broader to foliaceous; sepals especially near their base with rather soft, appressed hairs or nearly glabrous, not with patent bristly hairs as in *I. Nil*; outer sepals with a lanceolate to broad-lanceolate base, inner ones with a narrower base, all long and gradually linear-acuminate, 14—22 mm long; corolla funnel-shaped, 5—8 cm long, glabrous outside, bluish purple, afterwards more reddish purple or red, the limb darker than the tube. Stamens and style included; stamens unequal, inserted about 7—11 mm above the base of the corolla; filaments filiform, the base with long curled hairs; anthers linear, sagittate; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk low, annular. Capsule not seen in Malaysian specimens 1)).

Malay Peninsula, Johore, Mersing, Corner, Singapore Field n. 29757, Aug. 1935 (B).

Sumatra, West Coast, G. Talang, Laras Talang, Bünnemeyer 5179, Oct. 1918 (B, L).

Java, Buitenzorg, Buitenzorg, Boerlage s. n., Oct. 1888 (L); id., cultivated in the Botanic Garden, Hallier C7 and C165a, March 1893 and June 1895 (L); id., id., XV. H. 1; XV. H. 30 (B); Priangan, Tjipakoe, Boerlage s. n., Nov. 1888 (L); Tjinjiroean, Backer 5763, Dec. 1912 (B); Telaga Patengan, Lörzing 1427, March 1914 (B); Daradjat near Garoet, Burck 182, June 1895 (B); Bandoeng, cultivated, Backer 32313, Oct. 1903 (B); Tjibeureum, Smith & Rant 502, Apr. 1911 (B); Sindanglaja, cultivated, Koorders 42176 β, 42180 β, 42181 β, July—Aug. 1913 (B); Tasikmalaja, lake of Pendjaloe, Noesagede, probably introduced, Koorders 47914 β, 47915 β, July—Aug. 1917 (B, L); Pekalongan, Goemilem

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1) cf. Burck in Ann. Jard. Bot. Buitenz. X (1891) p. 115, note.

near Jasaredja, BACKER 16048, Sept. 1914 (B); Banjoemas, Batoer, Dieng plateau, BACKER 21731, Jan. 1917 (B); Magelang, Wonosobo, BRINKMAN 606, April 1935 (B); Semarang, Salatiga, DOCTERS VAN LEEUWEN s.n., Febr. 1909 (B); Malang, Malang, HAAGEN 331, July 1920 (B); Nongkodjadjar, WISSE 612, June 1921 (B); Tengger, BUYSMAN 328, Sept. 1907 (U); id., MOUSSET 286 (B).

CELEBES, Manado, between Manado and Tomohon, cultivated and escaped from culture, KOORDERS 16563 β, Jan. 1895 (B); Talaud Islands, Salibaboe, S. E. slope of G. Ajambana, LAM 3067, May 1926 (B); Miangas (Palmas) Island (according to MERRILL, 1923).

MOLUCCAS, Halmaheira, Soa Tobaroe, BEGUIN 2032, June 1922 (B); Ternate, a specimen without collector's name, numbered 300 (L, *type of Ipomoea amoena* BL.); REINWARDT s.n., Aug. 1821 (L); Akè bobotja, BEGUIN 920, Oct. 1920 (B); Tidore, REINWARDT s.n., Aug. 1821 (L); Batjan, BOERLAGE 565, Aug. 1900 (B); Kay Islands (according to WARBURG).

NEW GUINEA, Netherlands New Guinea, Schouten Islands, Biak, N. coast, FEUILLETAU DE BRUYN 403, Sept. 115 (B); Territory of New Guinea, between Ramu and the coast, SCHLECHTER 14181, Febr. 1902 (B); Finschhafen; Kelana; Constantinhafen; Gogol R.; Nowulja R., Oertzen M.; Ramu R. (according to SCHUMANN & LAUTERBACH); Papua, Strickland River (according to VON MUELLER, Pap. Pl. VII, 1886, p. 30).

BISMARCK ARCHIPELAGO, New Ireland, Lamekot, PEEKEL 23 (B); New Britain (according to VON MUELLER, Pap. Pl. IX (1890) p. 64).

PHILIPPINE ISLANDS, in thickets at low and medium altitudes (MERRILL). Romblon, ELMER 12159, March 1910 (L); also in Luzon (Cagayan, Ilocos Norte, Bontoc), Negros, the Babuyan Islands, and Jolo (MERRILL).

Distribution: Circumtropical.

Habitat: Waste places, thickets, hedges, edges of secondary forest, occasionally on sandy sea-shores, also cultivated; between 0 and 1650 m.

Vernacular names: boengah (Sumatra, West Coast, BÜNNEMEYER); pitoer (Celebes, Manado, KOORDERS); apoekoenga (Talaud Islands, LAM); lobokè ma dorooë (Halmaheira, BEGUIN); bulakan pulá (Philippines, Súlu language, MERRILL).

Remarks. 1. MERRILL used the name *Ipomoea indica* for this species, on account of *Convolvulus indicus*, a name of BURMAN. BURMAN based this name on the *Convolvulus coeruleus* of RUMPHIUS (Herb. Amb. V, p. 432), the identity of which is rather doubtful. I, therefore, prefer to use the name *I. congesta* R. BR., though still another name viz. *I. acuminata* R. & SCH., 1819, based on *Convolvulus acuminatus* VAHL, 1794, should have priority. There exists, however, already an *Ipomoea acuminata* RUIZ et PAV., 1799, a different species.

2. HOCHREUTINER in Candollea V (1934) p. 185 described a var. *brevipedunculata*. This variety is unknown to me.

3. *I. Leari* PAXT., Mag. VI (1839) t. 267 which is sometimes found

in culture for ornamental purposes seems to be not or scarcely different from *I. congesta* R. BR.

4. The density of the pubescence of this species is very variable. According to the description, the specimen which ROBERT BROWN used as the type of his *Ipomoea congesta* was tomentose.

7. **Ipomoea Decaisnei** VAN OOSTSTR., nov. nom. — *Pharbitis variifolia* DECAISNE, Herb. Timor. (1835) p. 62; SPANOGHE in Linnaea XV (1841) p. 338; non *Ipomoea variifolia* MEISSN.

A herbaceous annual (DECAISNE) twiner; stems thin, almost filiform, terete, glabrous or very sparsely pilose with long, patent hairs; leaves petiolate, petiole thin, shorter than the blade, (0.5—)2—4.5 cm long, with sparse patent hairs; leaf-blade broad-ovate, ovate to triangular, shortly or long-acuminate at the apex with an acute or obtusish, mucronulate point, cordate at the base, the sinus rounded, the auricles rounded, angular or sometimes the leaf-base sagittate; length (1.5—)3—9 cm, width (1—)1.5—7 cm; surfaces of the leaves sparsely or sometimes more densely pilose with the same hairs as the stems and the petioles. Inflorescences axillary, pedunculate, peduncle generally rather short, patently pilose, 0.5—4 cm long; flowers few at the end of the peduncle in an umbellate cyme; pedicels 5—9 mm long, in fruit 10—17 mm; bracts linear or filiform, the lower ones to 9 mm long with sparse patent hairs; sepals herbaceous, subequal, linear, attenuate into an acute point, patently hairy in the lower half (hairs with thickened base), glabrous towards the top, 8—15 mm long; corolla violet, funnel-shaped, glabrous, c. 2—2.5 cm long; stamens and style included; stamens inserted c. 6 mm above the corolla base; filaments unequal, filiform, dilated and hairy at the base; anthers ovate, sagittate, 1.5 mm long (in open flower); ovary glabrous; style filiform, glabrous; stigma biglobular; capsule globular, mucronate by the base of the style, with thin, straw-coloured wall, c. 7—8 mm high, opening by 4 valves; seeds black, 4—4.5 mm long, finely puberulent, mottled brownish and greyish.

JAVA, Kediri, Gadoengoen, KOORDERS 22836 β, June 1896 (B); Madoera, between Bangkalan and Arosbaja, BACKER 21122, June 1916 (B).

CELEBES, Celebes and Dependencies, Kalolo near Lombasang, BÜNNEMEYER 11554, May 1921 (B); P. Boeton, Baoe-baoe, ELBERT 2630, Sept. 1909 (L).

LOMBOK, Rindjani, N. side, Bajan, ELBERT 723, Apr. 1909 (L); Rindjani, S. S. E. side, Iwela near Pringgabaja, ELBERT 2005, June 1909 (L).

SOEMBAWA, Dompoe, Mrs. RENSCH 788, May 1927 (B).

TIMOR, without locality, REINWARDT s.n. (L, mixed with *I. plebeia* R. BR.); id., REINWARDT 1328, Apr. 1821 (L); id., SPANOGHE s.n. (L, mixed with *I. obscura* (L.) KER-GAWL.); Nonbouwn, TEYSMANN s.n. (B).

Distribution: East Java, South-West and South-East Celebes, Lesser Sunda Islands.

Habitat: Thickets, hedges, waysides; between 1 and 750 m.

Vernacular names: kelawat woengoe (Jav., Java, Soerakarta, KOORDERS); gamet (Jav., Java, Kediri, KOORDERS); daoen tapahaik (Timor, TEYSMANN).

Remarks. HALLIER identified the specimens of this species from Timor as *Ipomoea Meyeri* (SPRENG.) DON. Indeed *I. Meyeri,* from Central America, seems to be closely related. For the time being I prefer, however, to keep the species distinct, as I believe there are some points of difference mainly in the shape and size of calyx and corolla.

Subsection 2. *Cephalanthae* (CHOISY) HALL. f. emend.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 131; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511 (*Cephalantheae*) — *Ipomoea* section *Strophipomoea* § *Cephalanthae* CHOISY in DC., Prodr. IX (1845) p. 363 — *Ipomoea* section *Cephalanthae* BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 131 — *Ipomoea* section *Involucratae* BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr., IV, 2 (1905) p. 130.

Description see p. 484.

8. Ipomoea Pes-tigridis L., Spec. Pl. ed. 1 (1753) p. 162; BL., Bijdr. (1825) p. 709; ROXB., Fl. Ind. ed. CAREY, I (1832) p. 503 (*I. Pestigridis* WILLD.); SPANOGHE in Linnaea XV (1841) p. 340; WIGHT, Icon. t. 836; CHOISY in DC., Prodr. IX (1845) p. 363; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 609; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 204; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; WATT, Dict. Econ. Prod. India IV (1890) p. 488; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 105; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 134; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 216; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 128; id. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 63; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 158; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 311; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 116; KOORDERS, Exk. fl. Java III (1912) p. 119; KOORDERS-SCHUM., Syst. Verz. I (1910—13) Conv. p. 6; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 268; MERRILL, Spec. Blanc. (1918) p. 323; GAMBLE, Fl. Pres. Madras V (1923) p. 918; RIDLEY, Fl. Malay Penins. II (1923) p. 460; MERRILL, Enum. Philipp.

Fl. Pl. III (1923) p. 367; HEYNE, Nutt. Pl., ed. 2 (1927) p. 1305; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 524 — *I. hepaticaefolia* L., Spec. Pl. ed. 1 (1753) p. 161 — *Convolvulus Pes-tigridis* (L.) SPRENG., Syst. I (1825) p. 592.

Herbaceous annual; stems twining or sometimes prostrate, slender, terete, 0.5—2 m long (BACKER), patently hairy with rigid hairs. Leaves petiolate; petiole hairy like the stems, slender, 1.5—10 cm long; blade orbicular or transversely elliptic in outline, palmately divided nearly to the base, with 5—7, occasionally with 3 or with 9 segments, the segments oblong to elliptic-oblong or elliptic, attenuate or slightly acuminate towards both ends, acute or obtusish at the apex, minutely mucronate, mostly rather densely hairy with appressed to patent hairs, the sinuses between the lobes rounded; length and width of the blade 3—7.5 × 2.5—10 cm. Inflorescences pedunculate; peduncles 2—18 cm long, hairy like the stems, bearing an involucrate cymose, few-flowered head at their end; outer bracts of the involucre oblong, narrow-oblong, lanceolate-oblong or linear-oblong, 1.5—3 cm long, inner bracts smaller; flowers closing at c. 7 a.m. (BACKER); sepals slightly unequal in length, 7—12 mm long, lanceolate or the interior ones narrow-lanceolate, long-hairy; corolla much longer than the sepals, funnel-shaped, white, about 3—4 cm long, the limb c. 3.5 cm in diam. (BACKER); the midpetaline bands sparsely hairy; stamens included, the filaments inserted about 3 mm above the corolla base, slightly unequal, glabrous; anthers oblong, sagittate; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk annular; capsule about 8 mm high, ovoid, 4-valved, 1-celled, with 4 seeds; seeds sparsely grey-tomentose, 4 mm long.

MALAY PENINSULA, in waste ground, not very common (RIDLEY). Pahang, Pulau Tioman, Telok Paya, HENDERSON, Singapore Field n. 18438, May 1927 (B); also in Penang, Selangor and Malacca (PRAIN, RIDLEY).

SUMATRA, without locality, KORTHALS 129 (L); East Coast, Gedong djohore, S. of Medan, LÖRZING 3529, Febr. 1915 (B); West Coast, Padang, KORTHALS 179 (L); collector's name illegible, 229, Apr. 1870 (B); Benkoelen, Kroei, VAN STEENIS 3152, Oct. 1929 (B); Riouw and Dependencies, Riouw Archipelago, P. Toedjoeh, BÜNNEMEYER 5793, May 1919 (B).

JAVA, from West to East Java, at low altitudes, on soil pervious to water, in fields and thickets and along waysides and dikes (BACKER). Without locality, JUNGHUHN 5 (L); KORTHALS 128 (L); Batavia, Batavia, near old harbour, HALLIER s. n., Apr. 1895 (B); Tandjong Priok, KUIJL & VAN HASSELT 64, Apr. (L); id., HALLIER s. n., June 1896 (B); id., BACKER 23152, Dec. 1917 (B); Tjilintjing near Tandjong Priok, VAN STEENIS 559, Febr. 1928 (B); Meester Cornelis, JUNGHUHN 120 (L); id., BACKER 32332, Oct. 1902 (B); Bidara tjina, S. of Meester Cornelis, EDELING s. n. (B); Weltevreden, BAKHUIZEN VAN DEN BRINK fil. 3587, Febr. 1925

(B); Laanhof, S.W. of Weltevreden, Backer 32331, July 1902 (B); Goenoeng Sahari Sentiong near Weltevreden, Backer 32329, June 1902 (B); along Kali Soenter, Vorderman s. n., Dec. (B); Tjikoja, Zollinger 196 (L); near Tjikampek, Beumée 1582, March 1918 (B); Tjikoempai, E. of Poerwakarta, Harmsen 83, Dec. 1921 (B); Krawang, Korthals 100 (L); island Edam, near lighthouse, Backer 32125, Apr. 1906 (B); id., Backer 30971, Nov. 1920 (B); id., Boschma 252, Dec. 1921 (B); Buitenzorg, Tendjo, Backer 24052, Apr. 1918 (B); Tjileungsir, van Slooten 583, Dec. 1920 (B); id., Backer 31116, Dec. 1920 (B); Buitenzorg, cultivated in the Botanic Garden XV. K. B. XI. 6 (B); Pekalongan, near Soebah, Koorders 22515β, May 1896 (B); id., Koorders 27336β, Apr. 1897 (B); id., Koorders 27339β, Apr. 1897 (B, L); id., Koorders 36989β, May 1899 (B, L); sugar estate Doekoewringin near Slawi, Administrator sugar estate Doekoewringin 36, Jan. 1915 (B); Tegal, Backer 15217, Aug. 1914 (B); Magelang, E. side of mouth of K. Loekoela, Brinkman 60 (B); Semarang, Banjir (spate) canal, Docters van Leeuwen s. n., Aug. 1909 (B); forestry Tempoeran, Beumée 5103, March 1920 (B); Kedoengdjati, Koorders 28235β, June 1897 (B, L); Djapara-Rembang, Ngarengan, Koorders 33512β, 35517β, 35609β, May and June 1899 (B); Soerakarta, Horsfield s. n. (U); Jogjakarta, Jogjakarta, Vorderman s. n. (B); id., Goenoeng Kidoel, between Kemadang and Djepitoe, Backer 2764, Apr. 1912 (B); Madioen, Madioen, Wisse 37, May 1919 (B); Kediri, Toengloer, Wind 2532, 3294, Apr. 1918 (B); G. Wilis above Kediri, Backer 11303, Febr. 1914 (B); Soerabaja, Soerabaja, Dorgelo 245, Apr. 1922 (Pa); Malang, Djatiroto, Backer 7998, May 1913 (B); Semongkrong, Jeswiet 155, Nov. 1921 (W); id., van Slooten 2419, Apr. 1931 (B); G. Weni near Probolinggo, Backer 24287, June 1918 (B); Tretes, Backer 37463, March 1930 (Pa); Besoeki, Watoedodol, Clason & van Slooten 29, March 1931 (B); Baloeran, N.E. of Soemberwaroe, Clason-Laarman G. 77, Jan. 1932 (B); Asem Bagoes, Backer 8214bis, May 1913 (B); N. Banjoepoetih near Asem Bagoes, Beguin 165, March 1922 (B); Poeger-Watangan, Koorders 29995β, March 1898 (B, L); between Poeger and Amboeloe, Backer 18201, Dec. 1914 (B); Madoera, E. of Amboenten, Backer 21217, July 1916 (B); Bangkalan, Backer 19019, 19097bis, Febr. 1915 (B); N.E. of Batang batang daja, Backer 20876, March 1915 (B); Pamekasan, Backer 20355, March 1915 (B); Sampong, Backer 19586, March 1915 (B); Tamberoe, Backer 20469, March 1915 (B); Kangean Islands, Kangean, N. of Ardjasa, Backer 26758, March 1919 (B); id., Kangean, Kajoe Waroe, Backer 27979, Apr. 1919 (B); id., Paliat, Backer 29354, May 1919 (B); id., Saboenten, Backer 29885, May 1919 (B); id., Saeboes, Backer 29054, Apr. 1919 (B); id., Saoebi, Backer 28220, Apr. 1919 (B); id., id., Mahlmeister 8, March 1919 (B); id., Sapapan, Backer 28557, Apr. 1919 (B); id., Saseel, Backer 28642, Apr. 1919 (B); id., Sepandjang, Backer 28826, Apr. 1919 (B).

Celebes, Celebes and Dependencies, Makassar, Boentoeäla, Noerkas 21 (exped. van Vuuren), Febr. 1912 (B, L); Malino, Bünnemeyer 10760, Apr. 1921 (B); Bonto Parang, Bünnemeyer 10588, March 1921 (B); Rogang near Lombasang, Bünnemeyer 11499, May 1921 (B); Kalolo near Lombasang, Bünnemeyer 11553, May 1921 (B); P. Boeton, Baoe baoe, Kjellberg 58, Febr. 1929 (B); P. Moena, Raha, Elbert 2892, July 1909 (L); Manado, Gorontalo, Vorderman 12, June 1897 (B); id., Adjunct veterinary surgeon of Gorontalo 37a, Dec. 1928 (B).

Bali, Gilimanoek, de Voogd 1731, Apr. 1934 (B).

Lombok, Rindjani, N. side, Laboean tjarik, Elbert 625, Apr. 1909 (L); Warmada, Mrs. Rensch 62, March 1927 (B).

Soemba, Nabeso, Iboet 58, March 1925 (B, L).

Flores, Endeh, Mrs. Rensch 1004, June 1927 (B).

Timor, without locality, Reinwardt 1333 (L).

Moluccas, Ternate, Atasrip 27 (B); id., Forsten 6, July 1861 (L); id., Doefa doefa, Beguin 901, Oct. 1920 (B); Boeroe, Kajeli, Boerlage 551, Aug. 1900 (B); Ceram, island Boano, Kornassi 1288 (exped. Rutten), May 1918 (B, L, U); Ambon, Benteng, Rant 557, Oct. 1931 (B); Banda, coll. unknown, 106, 107 (L).

Philippine Islands, in all or most parts of the Philippines in open grasslands and waste places at low and medium altitudes (Merrill). Luzon, Zambales prov., Iba, Merrill 326, June 1902 (B); Bulacan prov., Angat, Aug. 1913, Merrill, Spec. Blanc. 292 (B, L); Rizal prov., Ramos, Bur. of Sc. 2060, Oct. 1913 (B, L); id., Ramos, Bur. of Sc. 1966, Nov. 1914 (B, L); id., Manila, Merrill 357, July 1902 (B); Laguna prov., Los Baños, Elmer 8100, Apr. 1906 (B); Prov. of Cavite, Mendez Nunez, Mangubat, Bur. of Sc. 1337, Aug. 1906 (B); Panay, Antique prov., McGregor, Bur. of Sc. 32333, May—Aug. 1918 (B, L).

Distribution: East tropical Africa, Mascarene Islands, continental tropical Asia, Malaysia.

Habitat: Grasslands, waste places, fields, thickets, occasionally in teak-woods; also on sandy soil near the sea; between 0 and 1000 m.

Vernacular names: laoe attan (Java, Batavia, Junghuhn); djemboetan, topong (Jav., Java, Pekalongan, Koorders); kontolan (Jav., Java, Semarang, Koorders); gamet (Jav., Java, Djapara-Rembang, Djokjakarta, Backer, Heyne, Koorders, Vorderman); gametan (Jav., Java, Besoeki, Koorders); kak samangkakan (Madur., Backer, Koorders); boengkoekoeäle, boemboehoewale (Celebes, Gorontalo, Vorderman; adjunct veterinary surgeon of Gorontalo); kahanga koeroeng (Soemba, Iboet); samaka foeroe (Ternate, Beguin, Heyne); maka maka (Tidore, Beguin, Heyne); sayor patolla, patolla oetang (Banda); bangbañgau-ñg-buduan (Philippines, Ilóko language, Merrill); malasandía, salasandía (Philippines, Panay Bisáya language, Merrill).

Use: See Watt and Heyne, l.l.c.c.

Remarks. Hallier distinguished in Bull. Herb. Boiss. VI (1898) p. 539 a var. *africana,* confined to continental Africa and a var. *indica* occurring in the Mascarene Islands, and in tropical Asia. He only gives a differential diagnose of these two varieties, from which appears that var. *africana* has larger leaves with more (7—11) longer, narrower, long-acuminate lobes, poor-flowered inflorescences, fewer, longer and narrower bracts and larger pink instead of white, flowers.

9. Ipomoea pileata Roxb., Fl. Ind. ed. Carey & Wall., II (1824) p. 94; id., ed. Carey, I (1832) p. 504; Choisy in Mém. Soc. Phys.

Genève VI (1833) p. 456; id. in DC., Prodr. IX (1845) p. 365; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 203; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 215; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 151; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 270; GAMBLE, Fl. Pres. Madras V (1923) p. 916 — *Convolvulus pileatus* (ROXB.) SPRENG., Syst. IV, 2 (1827) p. 61 — ? *C. trichocalyx* ZOLL. in Nat. en Geneesk. Arch. II (1845) p. 6.

Herbaceous annual; stems twining, slender, terete, retrorsely short-pilose; leaves petiolate; petiole thin, pilose like the stem, 1.5—10 cm long; blade ovate or broadly ovate, attenuate to slightly acuminate towards the apex with a blunt or acutish mucronulate point, base broadly cordate with obtuse sinus and broadly rounded auricles; surfaces pilose, beneath sometimes more densely than above; nerves 4—6 on each side of the midrib; length of blade 2—7 cm, width 1.5—5.5 cm. Inflorescences axillary; peduncles thicker than the petiole, pilose like the stem, 2—4.5 cm long; the flowers in a few- to several-flowered dense head, enclosed in a large foliaceous boat-shaped bract, 2.5—4 cm long, with two cusps; other bracts much smaller, oblong or elliptic, obtuse. Sepals herbaceous, the three outer ones oblong-spathulate to oblong, obtuse, 10 mm long, the two inner ones much narrower, lanceolate with a long and slender point, 9 mm long, all long pilose along the margins, and outside and inside especially in the upper part; corolla pink with darker centre or violet, hypocrateriform, about 3 cm long with narrow cylindrical tube and spreading limb; tube about 2 cm long, glabrous except near the top, limb with sparsely pilose, mucronate midpetaline areas; stamens included, inserted half-way the height of the corolla tube, unequal; filaments filiform, glabrous with exception of the slightly dilated base; anthers narrow-oblong, sagittate; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk low, annular, slightly lobed; capsule small, globose; seeds glabrous or thinly pubescent (BAKER & RENDLE).

SUMATRA, Bangka, Bakem, Soengai Liat, BÜNNEMEYER 1710, Oct. 1917 (B).

JAVA, ?, Pasir, ZOLLINGER 554 (L); Bantam, between Sadjira and Pasir Ajoenan, BACKER 2111, June 1911 (B); Batavia, Bidara tjina, S. of Meester Cornelis, EDELING (?) s. n. (B); Buitenzorg, Bolangs, W. of Buitenzorg, VAN STEENIS 2172, Aug. 1928 (B); Malang, Kepoeh, S. W. of Pasoeroean, BACKER 36396, June 1927 (Pa).

PHILIPPINE ISLANDS, Culion, in dry open places at low altitudes (MERRILL).

Distribution: East Tropical Africa, Mascarene Islands, British India to China, Indo-China and Malaysia.

Habitat: Dry open places, grassy waysides, fields; between 1 and 400 m.

Vernacular name: bissoer hoetang (Bangka, BÜNNEMEYER).

Remarks. Several authors [1]) have considered this species as being identic with the African *I. involucrata* BEAUV. and have mentioned it under that name. BAKER & RENDLE in THISELTON-DYER, Flora of Tropical Africa IV, 2 (1905) p. 150, 151 and 152 have rightly distinguished both as being two different species.

Section 4. **Batatas** (CHOISY) GRISEB.

GRISEB., Fl. Brit. West Indian Isl. (1864) p. 468; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 138; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511 — genus *Batatas* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 434 — *Ipomoea* subgenus *Batatas* (CHOISY) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 201 — *Ipomoea* section *Leiocalyx* HALL. f. sensu BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 132, p.p.

Description see p. 484.

10. Ipomoea triloba L., Spec. Pl. ed. 1 (1753) p. 161; CHOISY in DC., Prodr. IX (1845) p. 383, excl. syn. VAHL.; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 138; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 129; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 315; BACKER in Ann. Jard. Bot. Buitenz. 3rd Suppl. 1 (1910) p. 405; KOORDERS, Exk. fl. Java III (1912) p. 117; GAGNEP. & COURCH., in LEC., Fl. Indo-Chine IV (1915) p. 237; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510; id., Enum. Philipp. Fl. Pl. III (1923) p. 368, c. syn.; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 524 — *Convolvulus trilobus* (L.) DESR. in LAMK., Encycl. III (1789) p. 564 — *C. dentatus* BLANCO, Fl. Filip. ed. 1 (1837) p. 89; ed. 2 (1845) p. 66; ed. 3, I (1877) p. 123, t. 31, non VAHL (according to MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 63; id., Spec. Blanc. (1918) p. 322) — *Batatas triloba* (L.) CHOISY in Mém. Soc. Phys. Genève VIII (1838) p. 49; id. in DC., Prodr. IX (1845) p. 340 — *Ipomoea Blancoi* CHOISY in DC., Prodr. IX (1845) p. 389; MIQ., Fl. Ned. Ind. II (1857) p. 619; MERRILL in Philipp. Journ. Sc. I, Suppl. (1906) p. 119.

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[1]) ZOLLINGER, Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 609; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; MERRILL & ROLFE in Philipp. Journ. Sc. III (1908) p. 122; KOORDERS, Exk. fl. Java III (1912) p. 119; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 366.

A twining or sometimes prostrate herb; stems terete or slightly angular, 1—3 m long (BACKER), glabrous or sparsely hairy, especially at the nodes. Leaves petiolate; petiole shorter to longer than the blade, slender, glabrous, 3—10(—18) cm long, occasionally minutely tuberculate; blade broad-ovate to orbicular in outline, rarely narrower, entire, coarsely dentate to more or less deeply three-lobed, in the latter case the middle lobe ovate to oblong or narrow-oblong; the apex of the leaf obtuse, mucronulate, the base cordate, the auricles broadly rounded or angular; upper and lower surface of the blade glabrous or sparsely pilose; length of the blade 2.5—8 cm, width 2—7 cm. Inflorescences axillary, pedunculate; peduncles shorter or longer than the petioles of the subtending leaves, much thicker than these, glabrous, angular, minutely verrucose towards the top, 1-flowered or cymosely branched at the top and few- to several-flowered, branches of the cyme short, flowers consequently aggregate, peduncle 1—10(—12) cm long; pedicels angular, at least in dried state minutely verrucose, glabrous, 2.5—8 mm long; bracts minute, lanceolate-oblong; sepals slightly unequal, 7—8 mm long, the outer ones a little shorter; 3 outer sepals oblong to narrow-elliptic-oblong, obtuse or acutish, mucronulate, glabrous or with some hairs on the back, the margins always distinctly fimbriate (2 outer sepals fimbriate at both margins, third sepal fimbriate at one side; hairs with thickened base); 2 inner sepals somewhat broader, elliptic-oblong, acute, mucronulate, glabrous or sparsely hairy; corolla pink or pale red-purple, the centre sometimes darker, c. 18—20 mm long, glabrous, funnel-shaped, the limb with 5 short obtuse, rounded lobes; corolla closing before noon; stamens included, inserted c. 3—3.5 mm above the corolla base; filaments filiform, hairy at the base; anthers oblong, sagittate, c. 1.5 mm long; ovary with long hairs; style filiform, glabrous; stigma biglobular, papillose; disk low-cupular; capsule subglobular, 5—6 mm high, bristly hairy (hairs with thickened base), 4-valved, 2-celled, 4 or by abortion less-seeded; seeds glabrous, 3.5 mm long.

MALAY PENINSULA, Singapore, Singapore, junction of Owen Rd. and Serangoon Rd, FURTADO s. n., Nov. 1928 (B).

SUMATRA, East Coast, near Medan, LÖRZING 3075, Sept. 1914 (B).

JAVA, introduced from tropical America several years ago, now frequently naturalized in the lower parts, in thickets, hedges and cane fields (BACKER). Batavia, Batavia, near station, BACKER 32315, July 1903 (B); Weltevreden, BACKER 32330, Oct. 1903 (B); id., BACKER 32314, May 1902 (B); id., Tanah Abang, BACKER 32316, Oct. 1903 (B); id., Salemba, WEEHUIZEN 6, June 1917 (B); Buitenzorg, Depok, VAN STEENIS 2840, March 1929 (B); Buitenzorg, HALLIER 214, March 1893 (B, L); id., KOORDERS 32620β, July 1898 (B, L); Kotaparis, BAKHUIZEN VAN DEN BRINK fil. 14, 35, 356, May 1920, Apr.—June 1922 (B); cultivated in the Botanic Garden, Hallier C 166, Aug. 1894 (L); id., Hallier D 203, March 1893 (L); id., XV. H. 31; XV. K. B. X. 2; XV. K. B. XII. 11 (B); Tjitajam, Bakhuizen van den Brink fil. 1653, Aug. 1922 (B, L); Goenoeng Pangapoeran near Tjitajam, Bakhuizen van den Brink 5745, Oct. 1922 (B); G. Gedeh above Tjiandjoer, Backer 3121, Sept. 1911 (B); between Tjipeujeum and Radjamandjala, Backer 13448, May 1914 (B); Priangan, Garoet, Koens 164, May 1913 (B); Pekalongan, Batang, van Harreveld s. n., Dec. 1921 (B); id., Backer 15529, Sept. 1914 (B); Magelang, Magelang, van Oosten 18, Oct. 1919 (B); Semarang, Semarang, Kooper 910, Sept. 1932 (B); Bangkong, Docters van Leeuwen s. n., Apr. 1910 (B); Djapara-Rembang, Koedoes, herb. Koedoes 1128 (Pa); Kediri, Kediri, Backer 11242, Febr. 1914 (B); Soerabaja, Gresik, Dorgelo 3268 (Pa); Malang, Pasoeroean, Backer 7658, May 1913 (B, Pa); Pekoentjen, Jeswiet 206 & 207, Nov. 1922 (W); Tengger, Buysman 207, Aug. 1907 (U); Besoeki, Djember, Ultée 2 (B); Asem Bagoes, Backer 24988, June 1918 (B); id., Backer 8206, May 1913 (B); between Asem Bagoes and Ardjasa, Backer 8265, May 1913 (B); Ardjasa, E. of Sitoebondo, Backer 24746, June 1918 (B); Sitoebondo, Backer 24645, June 1918 (B); N. of Poeger, Backer 18285, Dec. 1914 (B); Madoera, Kangean Islands, Kangean, Tambajangan, Backer 27552, March 1919 (B); id., Kangean, Kajoe Waroe, Backer 27993, Apr. 1919 (B).

Borneo, without locality (according to Hallier in Bull. Herb. Boiss. V (1897) p. 1041).

Celebes, Celebes and Dependencies, Makassar, Kjellberg 3060, Jan. 1930 (B); Palopo, Kjellberg 1720, 4012, June 1929 (B).

Bali, N. W. Bali, Prapatagoeng, van Steenis 7647, Apr. 1936 (B).

Soemba, Laora, Iboet 342, Apr. 1925 (B, L).

Moluccas, Ambon, Robinson 1825, July—Nov. 1913 (B, L).

New Guinea, Papua, Kanosia, Carr 11074, Febr. 1935 (L).

Philippine Islands. "This species is common and widely distributed in the Philippines at low and medium altitudes in the settled areas, having been introduced from Mexico through the intermediary of the Acapulco-Manila galleons" (Merrill, Spec. Blanc.). Luzon, Cagayan prov., Bacani, For. Bur. 16462, Jan. 1909 (L); Rizal prov., Antipolo, Merrill, Spec. Blanc. 459, Oct. 1914 (B, L); id., Merrill 5171, Febr. 1906 (B, L); Laguna prov., Los Baños, Elmer 8271, Apr. 1906 (B); id., id., Mt. Maquiling, Elmer 18221, June—July 1917 (B, L, U); Negros, prov. Negros oriental, Dumaguete, Cuernos Mts, Elmer 10338, June 1908 (B, L); Mindanao, Cottabato, Copeland 1346, May 1904 (L); id., Robinson, Bur. of Sc. 11714, June 1910 (L).

Distribution: Originally in tropical America, now circumtropical, as a weed.

Habitat: Grasslands, thickets, hedges, waste places, waysides, fields, also in savannah-forests and occasionally on sandy sea-shores; 0—750 m.

Vernacular names: aurora (Philippines, Spanish, and Tagálog language, Merrill); bangbañgau, kamkamóte, koskusipa, kupitkupit (Philippines, Ilóko language, Merrill); halobagbug (Philippines, Tagálog language, MERRILL); muti-muti (Philippines, Cebu Bisáya language, MERRILL), sagikat (Philippines, Bagóbo language, MERRILL).

11. Ipomoea commutata R. & SCH., Syst. IV (1819) p. 228; CHOISY in DC., Prodr. IX (1845) p. 382 — *Convolvulus carolinus* L., Spec. Pl. ed. 1 (1753) p. 154, non *Ipomoea carolina* L., Spec. Pl. ed. 1 (1753) p. 160 — *Ipomoea trichocarpa* ELL., Sketch II (1822)[1] p. 260 (not seen) — *Convolvulus trichocarpus* (ELL.) SPRENG., Syst. I (1825) p. 593.

Very closely related to the preceding species. Mainly differing in the short-pilose stems, petioles, leaf blades, peduncles and pedicels, the thinner peduncles, the longer branches of the cymose inflorescences with less aggregate flowers, the paler, in dry specimens straw-coloured calyces with somewhat more pilose sepals, the margins of which bear less stiff hairs. Moreover the sepals often have a longer, needle-shaped mucro, whilst the outer ones are often distinctly shorter than the inner. The corolla is mostly larger than in *I. triloba*, to 3 cm long and is red-purple with a darker centre. Especially the longer branches of the inflorescences are characteristic for this species as distinct from the very short ones of *I. triloba*. The first ramification of the inflorescence is mostly dichasial, the sequent ones are monochasial.

JAVA, Semarang, forestry Bandjaran, BEUMÉE 4168, May 1919 (B); Kediri, Paré, VORDERMAN A 27 (B); forest district S. Kediri, Koetaredjo, on volcanic sand, BEUMÉE 2385, May 1918 (B); Blitar, cultivated, ULTÉE s. n. (B); Malang, Bantoer, BACKER 3859, June 1912 (B); Malang, ULTÉE s. n., Nov. 1927 (B); Lebak roto, S. slope of G. Semeroe, BACKER 36561, June 1930 (Pa).

Distribution: Tropical America.

Habitat: Cultivated in gardens; run wild in thickets and hedges; between 1 and 300 m.

Vernacular name: djendjenang (Jav., Java, Kediri, VORDERMAN).

12. Ipomoea Batatas (L.) LAMK., Tabl. Encycl. I (1791) p. 465; BL., Bijdr. (1825) p. 712; SPANOGHE in Linnaea XV (1841) p. 340; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 202; HILLEBR., Fl. Hawaiian Isl. (1888) p. 314; WATT, Dict. Econ. Prod. India IV (1890) p. 478; HALL.f. in ENGL., Bot. Jahrb. XVIII (1893) p. 138; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 212; HALL. f. in Versl. 's Lands Pl. tuin 1895 (1896) p. 129; id. in Bull. Herb. Boiss. V (1897) p. 380; id. in Meded. 's Lands Pl. tuin XIX (1898) p. 542; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 515; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1057; HALL. f. in Bull. Herb.

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[1] According to BARNHART in Bull. Torr. Bot. Club XXVIII (1901) p. 680.

Boiss. sér. 2. I (1901) p. 675; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 175; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 313; Merrill in Philipp. Journ. Sc. I, Suppl. (1906) p. 119; Hall. f. in Valeton, Pl. Pap. in Bull. Dep. Agric. Ind. Néerl. X (1907) p. 50; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 117; Koorders, Exk. fl. Java III (1912) p. 117, 122; Koorders-Schum., Syst. Verz. I (1910—13) Conv. p. 4; Gagnep. & Courch. in Lec., Fl. Indo-Chine IV (1915) p. 240 (incl. var. *lobata* l. c. p. 241); Merrill, Interpr. Rumph. Herb. Amb. (1917) p. 443; id. in Philipp. Journ. Sc. XIX (1921) p. 375; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 509; Ridley, Fl. Malay Penins. II (1923) p. 462; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 364; Heyne, Nutt. Pl. ed. 2 (1927) p. 1301; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 525; Ochse & Bakhuizen van den Brink, Indische Groenten (1931) p. 155, fig. 95 and 96 — *Convolvulus Batatas* L., Spec. Pl. ed. 1 (1753) p. 154; Roxb., Fl. Ind. ed. Carey, I (1832) p. 483 (*C. Batatas* Willd.); Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 62; id., Spec. Blanc. (1918) p. 323 — *C. edulis* Thunb., Fl. Jap. (1784) p. 84 — *Batatas edulis* (Thunb.) Choisy in Mém. Soc. Phys. Genève VI (1833) p. 435; id. in DC., Prodr. IX (1845) p. 338; Zoll., Syst. Verz. 2. Heft (1854) p. 128; Miq., Fl. Ned. Ind. II (1857) p. 599; id., Suppl. (1860) p. 235.

A herbaceous plant, containing a milky juice, cultivated for the subterraneous fusiform or elongate tubers and sometimes wild as a culture-relic. Stems prostrate to ascending, or occasionally twining, 1—5 m long, much branched, more or less angular, or terete, rooting at the nodes, glabrous or hairy, green or tinged with purple. Leaves petiolate; petiole shorter to much longer than the blade, glabrous or hairy like the stems, 4—20 cm long, green or tinged with purple; blade broad-ovate to orbicular in outline, the apex acute or obtusish, mucronulate, the base broadly cordate to truncate, the margin entire or angular to lobed, in the latter case the leaf more or less deeply palmately 3—5(—7)-lobed, the lobes broad or narrow, from broad-ovate to oblong or linear-oblong; upper and lower surface of the blade glabrous or sparsely hairy; length 4—14 cm, width 4—11 cm; nerves green or purple. Inflorescences axillary; peduncles stout, angular, glabrous or hairy like the stems, shorter to much longer than the petioles, cymosely 1- or few- to several-flowered, 3—18 cm long; pedicels 3—12 mm long; bracts minute, narrow, acute, 2—3 mm long, deciduous; sepals glabrous or pilose on the back and fimbriate, pale green, the outer ones oblong or elliptic-oblong, the inner ones elliptic-oblong to ovate-oblong, all acute or acutish, excurrent in a distinct mucro, equal in length or the inner ones longer, the outer ones 7—8 mm long, the inner ones to 9—12 mm; corolla pale violet, campanulate to funnel-shaped, gradually attenuate towards the base, glabrous, c. 3—4.5 cm long; stamens and style included; stamens inserted c. 4 mm above the corolla base; filaments filiform, unequal, glabrous, with exception of the hairy base; anthers linear-oblong, sagittate, c. 3 mm long; ovary hairy (or sometimes glabrous); style filiform, glabrous; stigma biglobular, papillose; disk cup-shaped, yellow; capsules rare, or absent in Malaysian specimens, ovoid, 4- or less-celled. Seeds glabrous.

Malay Peninsula; extensively cultivated (Ridley).

Sumatra, Atjeh and Dependencies, Gajoe and Alas-lands, Koeta per boeloehen, Pringo Atmodjo 521 (exped. van Daalen), Dec. 1904 (L); Tapanoeli, Batak-lands, Pringo Atmodjo 521 (exped. van Daalen) (B); Middle Habinsaran near Parsoboeran, cult., Lörzing 7836, Nov. 1920 (B); West Coast, Ophir District, Tanang Taloe, Bünnemeyer 1076, June 1917 (B); Benkoelen, Enggano Island, near Kajaäpoe, run wild, Lütjeharms 5361, July 1936 (B, L); Palembang, Moeara Doea, cult., Grashoff 386, May 1915 (B); Bangka, Pelangas, Teysmann 3195 HB (B); Bakem, Soengai Liat, wild, Bünnemeyer 1620, Oct. 1917 (B).

Java. According to Backer introduced in Java several centuries ago, now extensively cultivated at low and medium altitudes, on dikes of rice fields and as a second crop on rice fields; occasionally apparently wild, as a culture-relic. Bantam, Prinseneiland, Keulemans s.n. (L); Batavia, Batavia, cult., Junghuhn 32, Febr. (L); Kajoe poetih, E. of Weltevreden, cult., Backer 32310, Aug. 1904 (B); Kebajoran, S.W. of Weltevreden, cult., Backer 32309, July 1904 (B); Bidara tjina, Edeling (?) s.n. (B); island Edam, Boschma 210, Dec. 1921 (B); id., Boschma 311, Dec. 1921 (B); Duizend-eilanden (Thousand Islands), Noordwachter, inner side of *Barringtonia*-association, Boschma 4, Sept. 1921 (B); Buitenzorg, Buitenzorg, cultivated in the Botanic Garden, XV. K. B. XII. 4 (B); id., van Harreveld s.n., Aug. 1907 (Pa); near Buitenzorg, Hallier 211, May 1893 (B, L); Soekaboemi, Backer 14548, July 1914 (B); near Baraman-siang, cult., Hallier 211, May 1893 (B); Priangan, Bandoeng, near Dago waterfall, van Steenis 1678, May 1928 (B); Pekalongan, G. Semboeng, Backer 12461, March 1914 (B); Semarang, Doekoehseti, Tajoe, cult., Koorders 35420 β, June 1899 (B); Alasdowa, Koorders 35116 β, May 1899 (B); Sepakoeng, Telomojo, Koorders 35783 β, May 1899 (B); Sepakoeng, cult., Koorders 35787 β (B); Djapara-Rembang, Ngarengan, cult., Koorders 35600 β, May 1899 (B); Gragahan, cult., Koorders 35683 β, June 1899 (B); Malang, Tengger, Buysman s.n., March 1908 (U); id., Koorders 38077 β, Oct. 1899 (B); id., Ngadisan, cult., Koorders 38075 β, Oct. 1899 (B).

Borneo. Cultivated (Merrill, 1921).

Celebes, Celebes and Dependencies, Boeloe Balea, slope of G. Bonthain, cult., Bünnemeyer 12269, June 1921 (B); P. Boeton, Kaboengka, Kjellberg 200, 280, Febr. 1929 (B); P. Moena, Lombai, Elbert 2959, Aug. 1909 (L); Manado, Tondano, Forsten 56, June 1840 (L); Amoerang, cult., Koorders 16574 β, Apr. 1895 (B); near Pakoe-oere, cult., Koorders 16585 β, Apr. 1895 (B).

Lombok, Rindjani, N. E. side, Sembaloen plateau, Elbert 1535, May 1910 (L).

MOLUCCAS, Boeroe, Kajeli, VORDERMAN 50 (B); Ceram, between Kabailoo and Maneo, cult., RUTTEN 275, Oct. 1917 (B, L, U); RUTTEN 283, Oct. 1917 (B); Ambon [1]), ROBINSON, Pl. Rumph. Amb. 402, July—Nov. 1913 (L); G. Nona, BOERLAGE 99, July 1900 (B); Banda, without collector's name (L).

NEW GUINEA, Netherlands New Guinea, without locality, KOCH s.n. (L); Jabi M., cult., JANOWSKY 392, June 1913 (B); Tobadi, ATASRIP 114 (exped. WICHMANN) (B, L); Nassau Mts., Explorateurs bivouac, ladang, cult., DOCTERS VAN LEEUWEN 10510, Oct. 1926 (B); Territory of New Guinea, Ramu R., cult. (according to SCHUMANN & LAUTERBACH).

PHILIPPINE ISLANDS. Introduced by the Spaniards from Mexico in the early colonial period [1]), now widely distributed in the Philippines in cultivation and extensively used as food (MERRILL). Luzon, Benguet prov., Mt. Pulog, CURRAN, MERRITT & ZSCHOKKE, For. Bur. 18158, Jan. 1909 (L); Camarines prov., MERRILL, Spec. Blanc. 306, Dec. 1913 (B, L); Sorsogon prov., Irosin, Mt. Bulusan, ELMER 15578, Dec. 1915 (B, L, U); id., id., ELMER 16337, June 1916 (B, L, U).

Distribution: Tropical and subtropical regions of both hemispheres.

Habitat: Cultivated and occasionally wild as a culture-relic; at low and medium altitudes, in Java sometimes up to 2200 m (KOORDERS, 1912).

Vernacular names: See HEYNE, Nutt. Pl., l. c. p. 1301. Further names are: keledak (Mal., Malay Peninsula, RIDLEY); obie jellar (Sumatra, West Coast, BÜNNEMEYER); besih loeh, ketila abang (Sumatra, Palembang, LÜTJEHARMS, GRASHOFF); hoei djawa (Sund., ZOLLINGER); telo klinden, telo ireng (Jav., Java, Semarang, KOORDERS); ketelo mantang, ketelo krantol (Jav., Java, Djapara-Rembang, KOORDERS); ketelo abang, ketelo poetih (Jav., Java, Malang, KOORDERS); oewi-kan-im-bawi, oewi koelo (Celebes, Manado, Tontemboan language, KOORDERS); daun patatas (Boeroe, VORDERMAN); batatta mirra (Banda); loetoe kastela (Banda, MIQUEL); camóte (Philippines, all dialects, MERRILL); lapni (Philippines, Ifugáo language, MERRILL); panggi-bagun (Philippines, Súlu language, MERRILL); tigsi (Philippines, Bisáya language, MERRILL); tugi (Philippines, Bontók language, MERRILL). Also see DE CLERCQ—PULLE, Nieuw Plantk. Woordenb., ed. 2 (1927) p. 125.

Use. Cultivated for its edible tubers. The young shoots are eaten as a salad. For more detailed particulars concerning the use of this species see WATT, HEYNE and OCHSE & BAKHUIZEN VAN DEN BRINK [2]) ll.c.c. A large number of varieties is found in culture, mainly distinguished on account of the leaf-form and the size, form and colour of the tubers. The tubers are red, purple, orange, pale yellow or white.

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[1]) See MERRILL, Species Blancoanae, 1918, p. 323.

[2]) Also see the literature mentioned by OCHSE & BAKHUIZEN VAN DEN BRINK l. c. p. 159.

13. **Ipomoea gracilis** R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 484; CHOISY in DC., Prodr. IX (1845) p. 370; BENTH., Fl. Austr. IV (1869) p. 422; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1063; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 445; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 509; id., Enum. Philipp. Fl. Pl. III (1923) p. 365; id. in Philipp. Journ. Sc. XXIX (1926) p. 413; DOCTERS VAN LEEUWEN in Ann. Jard. Bot. Buitenz. XLVI—XLVII (1936) p. 405, photogr. 12, 39, 43, 46; VAN STEENIS in Trop. Nat. XXVIII (1939) p. 145, 146, fig. 6 — *Convolvulus denticulatus* DESR. in LAMK., Encycl. III (1789) p. 540 — *C. gracilis* (R. BR.) SPRENG., Syst. I (1825) p. 604 — *Ipomoea littoralis* BL., Bijdr. (1825) p. 713; CHOISY in DC., Prodr. IX (1845) p. 352; ZOLL., Syst. Verz. 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 603; HALL. f. in VALETON, Pl. Pap. in Bull. Dép. Agric. Ind. Néerl. X (1907) p. 50; RIDLEY, Fl. Malay Penins. II (1923) p. 461 — *I. denticulata* (DESR.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 467, non R. BR., 1810; id. in DC., Prodr. IX (1845) p. 379; MIQ., Fl. Ned. Ind. II (1857) p. 616; BENTH., Fl. Austr. IV (1869) p. 421; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 208; SCHUM. & HOLLR., Fl. Kais. Wilh. Land (1889) p. 114; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 412; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 106; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 139; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 223; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 129; id. in Bull. Herb. Boiss. V (1897) p. 380; id. in Meded. 's Lands Pl. t. XIX (1898) p. 543; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 516 [1]; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1062; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 314; KOORDERS, Exk. fl. Java III (1912) p. 117; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 266; RENDLE in GIBBS, Contr. Phyt. Fl. Arfak Mts (1917) p. 218.

A glabrous or sometimes sparsely hairy littoral plant. Stems prostrate and rooting (always?), or twining, thin, slender, herbaceous or becoming woody with age; leaves petiolate; petiole shorter to longer than the blade, thin, 0.5—7 cm long; blade broad-ovate, ovate or oblong in outline, occasionally orbicular to kidney-shaped, the margin entire or slightly undulate to angular, or more or less deeply 3-lobed, the apex acute, obtusish, obtuse or retuse, mucronulate, the base cordate; upper and lower surface glabrous or nearly glabrous; the leaves are membranaceous or often thicker and are very variable in size: length of the blade 1—10 cm, width of the blade 1—7.5 cm. Inflorescences axillary; peduncles mostly short, 1—30 mm long, rarely to 90 mm, glabrous, 1- or few-flowered; pedicels long and thin, mostly longer than the calyx, 10—25(—40) mm long, glabrous; bracts minute, narrow, 1—2 mm long, deciduous; sepals glabrous, concave, the outer ones shorter than the inner ones; 2 outer sepals oblong-elliptic or elliptic, acutish or obtusish, 3 inner sepals elliptic to orbicular, all mucronulate with the mucro at the top or somewhat below it; outer sepals thin-coriaceous, inner ones thinner with membranous margins; length of outer sepals 6—10 mm, of inner sepals 8—12 mm; corolla pink or pink purple, often darker near base inside, funnel-shaped, 3—4.5 cm long, the rather narrow tube gradually attenuate towards the base, glabrous; stamens and style included; stamens inserted c. 5 mm above the corolla base; filaments filiform, unequal, glabrous in the upper half, the lower half hairy, especially at the slightly dilated base; anthers oblong, sagittate, c. 3 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk white (Backer), cup-shaped; capsule depressed-globose, crowned by the style base, c. 9 mm in diam., 2-celled, 4-seeded; seeds glabrous, black, c. 3.5—4 mm long.

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[1] A specimen HOLLRUNG 155, mentioned by SCHUMANN in ENGL., Bot. Jahrb. IX (1887) p. 216 under *Calystegia affinis* ENDL., belongs to *Ipomoea gracilis* R. BR. See VAN OOSTSTROOM in Blumea III (1939) p. 286.

Malay Peninsula, sea sands, not common (Ridley). Pahang, Tanjong Tembiling, Kuantan, collector ?, Singapore Field n. 221, June 1913 (B); Telok Sisik, Kuantan, Henderson, Singapore Field n. 22764, Aug. 1929 (B); also in Penang, Dindings, Perak, Pahang, Johor and Singapore (Prain, Ridley).

Sumatra, Tapanoeli, Nias, Hinako Island, von Römer s. n., Jan. (B); Batoe Islands, Raap 33, 335, Sept. 1896 (B); West Coast, Padang, Junghuhn 96, May (L); Benkoelen, Benkoelen, Ajoeb 24 (exped. Jacobson), June 1916 (B); Enggano Island, Kiojoh, Lütjeharms 4682, June 1936 (B, L); Enggano Island, P. Bangkei, Lütjeharms 5143, June 1936 (B); Lampong Districts, Krakatau, Backer 32180, Apr. 1906 (B); id., Docters van Leeuwen 3517, 3550, Apr. 1919 (herb. D. v. L.); Lang Island, Backer 32171, May 1908 (B); id., Docters van Leeuwen 14242, May 1932 (herb. D. v. L.); Sebesi Island, Docters van Leeuwen 5190, Apr. 1921 (B); Verlaten Island, Backer 32170, May 1908 (B, L); id., Docters van Leeuwen 3725, 4027, Apr. 1919, 1920 (herb. D. v. L.); Riouw and Dependencies, Riouw Archipelago, P. Toedjoeh, Tg. Pasir, Bünnemeyer 5843, May 1919 (B, L); id., id., Bünnemeyer 5844, May 1919 (B); P. Toekoela near P. Bintan, Bünnemeyer 6294, June 1919 (B, L); Lingga Archipelago, P. Lingga, W. coast, Teysmann s. n. (B); id., id., P. Singkep, Dabo, Bünnemeyer 7312, Aug. 1919 (B); Anambas and Natoena Islands, Siantan, near Terempa, van Steenis 838, March 1928 (B); Boengoeran, S. of Ranai, van Steenis

1299, Apr. 1928 (B, L); Bangka, Soengei Liat near Muntok, Berkhout 503, Aug. 1886 (B); id., Bünnemeyer 1541, 1938, Oct.—Nov. 1917 (B, L); Muntok, Teysmann s. n. (B); P. Lepar, Koemboeng, Bünnemeyer 2368 (B).

Java, without locality, Blume 1710 (L, *type of I. littoralis* Bl.); Korthals 247 (L); Bantam, between Pasaoeran and Anjer, Backer 7208, March 1913 (B); Djoengkoelon, coll. indig. s.n. (B); Malingping, near mouth of Tji Langkahan, Backer 1411, June 1911 (B); Batavia, Duizend-eilanden (Thousand Islands), Noordwachter, Boschma 75, Sept. 1916 (B); id., in *Barringtonia* association, van Slooten & Backer 35043, Sept. 1921 (B, L); P. Doea, Smith 122a, Dec. 1906 (B); P. Sariboe, Greshoff s.n. (B); Buitenzorg, Pelaboean Ratoe, in *I. Pes-caprae* association, Backer 730, Dec. 1911 (B); id., Karang Kawoe, Bruggeman & Hagen 904, Nov. 1931 (B); Buitenzorg, cultivated in the Botanic Garden, XV. H. 37 (B, L); id., Hallier C 167b, Aug. 1894 (L); Kediri, bay of Damas near Prigi, Backer 11967, Febr. 1914 (B); Malang, E. of mouth of Kali Srigontjo, Backer 3969, June 1912 (B); Srigontjo, Zollinger 1207 (B); Besoeki, Bondowoso, mouth of Kali Soekamadi, Clason s.n., Sept. 1936 (B); id., Booberg s.n., Sept. 1937 (B); Madoera, Kangean Islands, Sepandjang, Backer 28834, 29052, Apr. 1919 (B).

Borneo, W. Division, P. Lemoekoetan, Hallier 278 (B); Pasir Pandjang near Singkawang, Miss Polak 264, Dec. 1936 (B); id., Dunselman 68, Febr. 1937 (B); S. and E. Division, Asem asem near Pelaihari, Forestry Bureau 1960, May 1919 (B); Poeloe berat bassa, near Bontong, Rutten 454, March 1911 (U); Sarawak (Merrill, 1921); British North Borneo, Banguey Island, Castro & Melegrito 1475, July—Sept. 1923 (B).

Celebes, Celebes and Dependencies, Moeara Sampara, Kjellberg 1333, Apr. 1929 (B); Lelewaoe, Latoöe, Kjellberg 2580, Oct. 1929 (B); Salajar, Docters van Leeuwen 1736, May 1913 (B, U); P. Boeton, Pasar Wadjo, Kjellberg 272, Febr. 1929 (B); Manado, Manado, Koorders 16561 β, Dec. 1894 (B, L); Palele, Koorders 16576 β, May 1895 (B, L); Ratatotok, Koorders 16560 β, 16575 β, March 1895 (B, L); Talaud Islands, Karakelang, Koeala Bahewa, Lam 3025, May 1926 (B).

Moluccas, Halmaheira, N. Galela, Beguin 1745, Sept. 1921 (B); Ternate, Sango, Beguin 1075, Nov. 1920 (B); Boeroe, Kajeli, Vorderman 54 (B); Ambon, Robinson 399, July—Nov. 1913 (B, L); Batoe merah, Rant 829, Nov. 1931 (B); Hila, Teysmann s. n. (B); Banda, without collector's name (L).

New Guinea, Netherlands New Guinea, Schouten Islands, Biak, N. coast, Feuilletau de Bruyn 267, 279, 398, Aug.—Sept. 1915 (B); P. Doom, Sorong, collector unknown, n. 1, Febr. 1913 (B); mouth of Mamberamo, Janowsky 447, Sept. 1913 (B); Merauke, Koch s. n. (L) and f. 11. c. (B); id., Versteeg 1942, Nov. 1907 (B); Okaba, Branderhorst 69, Sept. 1907 (B); Territory of New Guinea, mouth of Markham River, Weinland 200 (BD, mixed with *Merremia gemella* (Burm. f.) Hall. f.); Finschhafen, Hatzfeldthafen, Kelana, Bussum, Huon bay (Schumann & Lauterbach, Warburg); Papua, Lower Fly River, east bank opp. Sturt Island, common on river banks, Brass 8196, Oct. 1936 (L).

Bismarck Archipelago, New Ireland, Peekel 94 (B, L).

Philippine Islands; throughout the Philippines on sandy beaches and in thickets along the seashore (MERRILL). Luzon, AHERN 2985 (B); Prov. Ilocos Norte, Bangui, RAMOS, Bur. of Sc. 27601, Febr.—March 1917 (B); Cagayan prov., RAMOS, Bur. of Sc. 7474, March 1909 (L); Pangasinan prov., Santiago Is., CLEMENS 18174, March 1928 (B); Sorsogon prov., Irosin (Mt Bulusan), ELMER 15757, May 1916 (B); Busuanga, MERRILL 413, Sept. 1910 (U); Palawan, Taytay, MERRILL, Bur. of Sc. 9305, May 1913 (B, L); Balabac Island, MANGUBAT, Bur. of Sc. 430, March—Apr. 1906 (B).

Distribution: Coasts of the Indian and Pacific Oceans: Madagascar and adjacent islands, British India, Ceylon, Indo-China, eastwards to N. Australia and the Pacific Islands; according to HALLIER (1894) in Mexico and the West Indies.

Habitat: On sandy beaches and in thickets (occasionally covering large trees) near the sea-shore; between 0 and 15 m.

Vernacular names: tapak kuda kechik (Malay Peninsula, Pahang); akar hitang (Mal., Sumatra, Palembang, LÜTJEHARMS); kangkon laut (Bangka, BERKHOUT); sejawoe salojon, siahaboe salojen (Manado, Ponosakan language, KOORDERS); wanaring pante (Manado, Tomboeloe language, KOORDERS); barwoean'a (Talaud Islands, LAM); lobokè, lobokè ma loha (Halmaheira, BEGUIN); sajor petoe (Boeroe, VORDERMAN); tjoef (P. Doom, Sorong); gamielke (New Guinea, KOCH); bulakán (Philippines, Tagálog language, MERRILL); ditadit (Philippines, Ivatán language, MERRILL); koskusipa (Philippines, Ilóko language, MERRILL); malakamóte (Philippines, Ibanág language, MERRILL); panggi-panggi (Philippines, Súlu language, MERRILL).

Section 5. **Leiocalyx** HALL. f. emend.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 139; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 132, p.p.

This section in its new limitation includes the section *Leiocalyx* in the sense of HALLIER, 1893, and the genera *Calonyction* CHOISY and *Quamoclit* MOENCH.

Subsection 1. *Eu-Leiocalyx* VAN OOSTSTR., nov. subsect.

Ipomoea section *Leiocalyx* HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 139, s.s.; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 132, p.p.

Description see p. 484 under section *Leiocalyx*.

14. Ipomoea obscura (L.) KER-GAWL. in Bot. Reg. III (1817) t. 239; DECAISNE, Herb. Timor. (1835) p. 65; SPANOGHE in Linnaea XV

(1841) p. 339; Choisy in DC., Prod. IX (1845) p. 370 [1]; Zoll. Syst. Verz. 2. Heft (1854) p. 129; Miq., Fl. Ned. Ind. II (1857) p. 611 [1]; Benth., Fl. Austr. IV (1869) p. 424; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 207; Forbes, Wander., Germ. ed. II (1886) p. 222; Vidal y Soler, Rev. Plant. Vasc. Philipp. (1886) p. 196; Watt, Dict. Econ. Prod. India IV (1890) p. 488; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 106; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 140; Trimen, Handb. Fl. Ceyl. III (1895) p. 220; Hall. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 129; id. in Bull. Herb. Boiss. V (1897) p. 380; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 511 excl. syn. *I. ochroleuca* Spanoghe; Manson Bailey, Queensl. Fl. IV (1901) p. 1064; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 164; Merrill in Philipp. Journ. Sc. I, Suppl. (1906) p. 119; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 115; Koorders, Exk. fl. Java III (1912) p. 118; Koorders-Schum., Syst. Verz. I (1910—13) Conv. p. 5; Gagnep. & Courch., Fl. Indo-Chine IV (1915) p. 246; Gamble, Fl. Pres. Madras V (1923) p. 916; Ridley, Fl. Malay Penins. II (1923) p. 461; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 366; Heyne, Nutt. Pl. ed. 2 (1927) p. 1304; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 526 — *Convolvulus obscurus* L., Spec. Pl. ed. 2 (1762) p. 220; Burm. f., Fl. Ind. (1768) p. 44; Hassk., Pl. Jav. Rar. (1848) p. 519 — *Ipomoea solanifolia* auct., non L.; Burm. f., Fl. Ind. (1768) p. 49 — *I. luteola* R. Br., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 485; Choisy in DC., Prodr. IX (1845) p. 369 — *I. insuavis* Bl., Bijdr. (1825) p. 716.

Stems twining or prostrate, the older parts lignescent, 1—2 m long (Backer), thin and slender, glabrous or patently hairy, sometimes almost lanate, the older stems with a longitudinally grooved and transversely split bark. Leaves petiolate; petiole long, slender, up to 9 cm long; glabrous or sparsely hairy; blade ovate, broad-ovate to orbicular or almost kidney-shaped, with entire or slightly undulate margin, attenuate or acuminate towards the apex, the top acute or obtusish to obtuse, mucronulate, the base widely cordate, the auricles broadly rounded; upper and lower surface of the blade glabrous or sparsely pilose, with short, appressed hairs or only fimbriate along the margins; length of the blade 2—10 cm, width of the blade 2—9 cm. Inflorescences axillary; peduncles thin, almost filiform, glabrous or sparsely pilose, with short hairs, 1- or few-flowered, 1—14 cm long; pedicels much longer than the small calyx, c. 1—2 cm long, very minutely verrucose, glabrous or with some hairs, thickened towards the top in fruit; bracts minute, narrow, acute, 1—2 mm long; sepals glabrous or sometimes pubescent, subequal or the two outer ones somewhat shorter, acutish, mucronulate, the outer ones with narrow, white margins, the middle portion thicker, minutely verrucose, green; the inner ones thinner; outer sepals ovate, inner ones broad-ovate, length of sepals 3—4 mm; sepals often reflexed in fruit; corolla white or pale yellow with a dark purple centre, funnel-shaped, c. 2—2.5 cm long, the limb 2.5—3 cm in diameter; stamens and style included; stamens inserted c. 3 mm above the corolla base; filaments filiform, very unequal in length, hairy at the dilated base; anthers oblong, sagittate, 2 mm long; ovary glabrous; style filiform, glabrous; stigma globular, papillose; capsule straw-coloured, broad-ovoid, crowned by the style base, 7—8(—9) mm high, 4-valved, 2-celled, 4-seeded; seeds black, finely grey-puberulent, c. 4—4.5(—5) mm long.

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[1] Var. *glabra* Choisy l.c., based on a specimen from Timor, collected by Guichenot, is unknown to me.

MALAY PENINSULA, Singapore (RIDLEY).

SUMATRA, East Coast, Haranggaol, lake Toba, LÖRZING 8826, May 1922 (B); Tapanoeli, near Pangoeroeran, Samosir, LÖRZING 7655, Nov. 1920 (B); West Coast, Singalang, KORTHALS 236 (L); foot of G. Malintang, BÜNNEMEYER 4457, Aug. 1918 (B, L).

JAVA, at low altitudes, in thickets, hedges and thin forests (BACKER). Without locality, HORSFIELD s. n. (L, U); JUNGHUHN 37, 43 (L); KORTHALS 272 (L); KUHL & VAN HASSELT 68, 209 (L); Bantam, Serang, VAN WELSEM s. n. (B); Batavia, Batavia, KUHL & VAN HASSELT 72 (L); id., PIEPER 67 (L); id., VORDERMAN s.n. (B); id., RAAP 418, June 1894 (L); id., HALLIER s. n., Apr. 1895 (B); Soenter, VORDERMAN s. n., Dec. (B); Tandjong Priok, edge of mangrove, SCHIFFNER 2436, July 1894 (L); Tjilingtjing near Tandjong Priok, sandy saliferous soil, VAN STEENIS 544, Febr. 1928 (B); Goenoeng Sahari Sentiong, BACKER 32326, May 1902 (B); Weltevreden, WEEHUIZEN 5, June 1917 (B); Tjikoja, ZOLLINGER 726 (L); Pekapoeran, SCHEFFER s. n., Aug. 1871 (B); Poerwakarta, BACKER 13871, June 1914 (B); Buitenzorg, Buitenzorg, BOERLAGE s. n., Dec. 1888 (L); id., REINWARDT 365 (L); id., BAKHUIZEN VAN DEN BRINK fil. 2174 (B); id., along the Tjiliwoeng, HALLIER 213b, March 1893 (B); id., Pasir Koeda, HALLIER 213a, March 1893 (B); id., cultivated in the Botanic Garden, TEYSMANN s. n. (L); HALLIER C 5a, Apr. 1893 (L); XV. K. B. X. 11 (B); XV. K. B. XI. 9 (B); Tjitajam, BAKHUIZEN VAN DEN BRINK fil. 1661, Aug. 1922 (B, L); G. Pangapoeran near Tjitajam, BACKER 5743, Oct. 1922 (B); Tjiomas, SOEGANDIREDJA 111, March 1900 (B); Koeripan, SCHEFFER s. n., Nov. 1870 (B); Depok, BAKHUIZEN VAN DEN BRINK 1465, July 1922 (B); Soekaboemi, BACKER 14774, July 1914 (B); Priangan, Tjipanes near Garoet, KOENS 21, May 1913 (B); G. Telagabodas near Pangentjongan, KOENS 241, May 1913 (B); between Legok djawa and Kelapa genep, SCHEFFER s. n., Oct. 1871 (B); Cheribon, Indramajoe, BACKER 16693, Sept. 1914 (B); between Linggar djati and Koeningan, BACKER 5025, Oct. 1912 (B); Pekalongan, Brebes, BACKER 15445, Sept. 1914 (B); sugar estate Doekoewringin, near Slawi, Administrator Sugar estate Doekoewringin

82, Febr. 1915 (B); Tegal, Winckel s. n., Oct. 1917 (B, L); forestry E. Tegal, Beumée 4392, Sept. 1919 (B); Banjoemas, Kawoenganten, Backer 4641, Sept. 1912 (B); Magelang, N. E. slope of G. Soembing, Lörzing 410, May 1912 (B); Semarang, Semarang, Docters van Leeuwen s. n., Apr. 1910 (B); Pendrian, Docters van Leeuwen s. n., Apr. 1910 (B); Daroepana, Backer 16453, Sept. 1914 (B); Sendang Ngesong, Koorders 28234 β, June 1897 (B, L); Ambarawa, Brinkman 537, Dec. 1932 (B); Salatiga, culture garden, Docters van Leeuwen s. n., March 1909 (B); Djapara-Rembang, Ngarengan, Koorders 35605 β, May 1899 (B); Toedir, Büsgen 62, Dec. 1902 (B); forestry Bekoetoek, Blokhuis s. n., July 1919 (B); Soerakarta, N. of Solo, Backer 6423, Jan. 1913 (B); Jogjakarta, in rice fields, Junghuhn 95, Apr. (L); Madioen, Madioen, Backer 6964, Febr. 1913 (B); id., Wisse 29, Apr. 1919 (B); E. of Madioen, Wisse 706, Aug. 1921 (B); Ngebel, Koorders 29192 β, Aug. 1897 (B); Kediri, Kediri, Backer 11257, Febr. 1914 (B); Teloeng Agoeng, Lörzing 979, Febr. 1914 (B); G. Keloed, W. slope, Lahar Temas above Bendoredjo, on volcanic sand, van Harreveld 8, Apr. 1922 (B); Soerabaja, Soerabaja, Dorgelo 237, Apr. 1922 (Pa); Malang, Tengger, Buysman s. n., March 1908 (U); Tengger, W. slope near Pogal, Mousset 570 (B); Gondang legi, Backer 4664, June 1912 (B); Besoeki, Djember, Ultée 11 (B); between Djember and Bondowoso, Backer 17754, Dec. 1914 (B); Asem Bagoes, Backer 8205, May 1913 (B); between Litjin and Banjoewangi, Koorders 43693 β, Aug. 1916 (B); Pantjoer, Idjen, Koorders 28510 β, Aug. 1897 (B); near Poeger, Koorders 21070 β, Oct. 1895 (B); id., along Kali Bedadoeng, Koorders 21071 β, Oct. 1895 (B); Sitoebondo, Backer 24631, June 1918 (B); Madoera, Kamal, Backer 19240, Febr. 1915 (B); Ketapang daja, Backer 19964, March 1915 (B); Sampang, Backer 19663, March 1915 (B); Kangean Islands, Kangean, Pabean, Beguin W 2, June 1919 (B); id., id., Djoekoeng djoekoeng, Backer 27551, March 1919 (B); id., id., Kajoe Waroe, Backer 27992, Apr. 1919 (B); id., S. E. Paliat, Backer 29535, May 1919 (B); id., Saboenten, Backer 29677, 29827, May 1919 (B); id., Saeboes, Backer 29138, Apr. 1919 (B); id., Saoebi, Backer 28404, Apr. 1919 (B).

Celebes, Celebes and Dependencies, Boeloe Tanah near Lombasang, Bünnemeyer 11435, May 1921 (B); Tanette, Bünnemeyer 11741, May 1921 (B); Boeloe Parigi near Tanette, Bünnemeyer 12444, June 1921 (B); Madjene, Rachmat 141 (exped. van Vuuren), July 1913 (B); Mamoedjoe, Rachmat 208 (exped. van Vuuren), July 1913 (B); Tolo, Mrs. Bouman-Houtman 96 (B); P. Boeton, Baoe baoe, Kjellberg 57, Febr. 1929 (B).

Lombok, Rindjani, N. side, Laboean tjarek, Elbert 567, Apr. 1909 (L); id., N. side, Bajan, Elbert 731, Apr. 1909 (L); id., S. S. E. side, Pringgabaja, Elbert 2100, June 1909 (L).

Soembawa, Bima, Donggo, Kenanta, Elbert 3580, Dec. 1909 (L); Batoe Doelang, Mrs. Rensch 753, May 1927 (B).

Soemba, Laora, Iboet 341, Apr. 1925 (B, L).

Timor, without locality, Spanoghe s.n. (L, mixed with *I. Decaisnei* van Ooststr.); Nonbauun, Teysmann s.n. (B); S. Middle Timor, Soë, on weathered limestone, Mrs. Walsh 11, Dec. 1928 (B).

Wetar, hills near lake Tihoe, Eucalypt-forest, Elbert 4596, Febr. 1910 (L); Ilmedo, Eucalypt-savannah, Elbert 4701, March 1910 (L).

MOLUCCAS, Ternate, BEGUIN 809, Oct. 1920 (B); Ceram, N. Ceram, Wahai, KORNASSI 5 (exped. RUTTEN), Aug. 1917 (B, L, U); Ambon, Hila, BOERLAGE 304, July 1900 (B).

NEW GUINEA, Papua, Kanosia, under *Hevea*, CARR 11522, Febr. 1935 (L).

PHILIPPINE ISLANDS; throughout the Philippines in open grasslands and borders of thickets at low and medium altitudes, often common (MERRILL). Luzon, Rizal prov., RAMOS, Bur. of Sc. 1965, Nov. 1914 (B, L); id., Antipolo, MERRILL 94, Jan. 1910 (U); Laguna prov., Los Baños, ELMER 8270, Apr. 1906 (B); Palawan, Taytay, MERRILL, Bur. of Sc. 1261, May 1913 (B, L).

Distribution: East tropical Africa, Mascarene Islands, tropical Asia, N. Australia.

Habitat: Grasslands, thickets, hedges, thin forests, waysides, waste ground, occasionally on sandy soil near the sea; 1—1300 m.

Vernacular names: aroy tali kentjir, aroy ki kalindan (Sund., Java, BLUME, HASSKARL, KOORDERS, MIQUEL); ojet kitjil (Jav., BURMAN, MIQUEL); ki papesan (Sund., BACKER, HEYNE); indjen indjenan, malingan, tingkil (Jav., BACKER, HEYNE); tatampajan (Java, Batavia, SCHEFFER); minjak minjakan (Java, Batavia, PIEPERS); aroy kalindan (Java, Buitenzorg, REINWARDT); anton anton (Jav., Java, Pekalongan, Administrator sugar estate Doekoewringin); klawatangede (Jav., Java, Semarang, KOORDERS); rojotang (Jav., Java, Madioen, WISSE); djoemplingan (Jav., Java, Besoeki, KOORDERS); katjoeping (Madur., Java, Besoeki, KOORDERS); kaloh bibi (Celebes and Dep., HEYNE, RACHMAT); kuskusipa, bangbañgau (Philippines, Ilóko language, MERRILL); panggi-panggi (Philippines, Súlu language, MERRILL).

Use: See WATT l. c. and HEYNE l. c.

Remarks. HALLIER distinguished a var. *abyssinica*[1]) and a var. *indica*[1]) of this species. The specimens from Malaysia belong to var. *indica*. Specimens from Timor which HALLIER reckoned to var. *abyssinica* (in ENGL., Bot. Jahrb. XXVIII, 1899, p. 39) most probably belong to *I. ochroleucea* SPANOGHE.

15. Ipomoea ochroleucea[2]) SPANOGHE in Linnaea XV (1841) p. 340; MIQ., Fl. Ned. Ind. II (1857) p. 614 (*I. ochrolacea*).

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[1]) HALLIER f. in Jahrb. Hamb. wiss. Anst. XV (1898) p. 6; var. *abyssinica* occurs in tropical Africa and Arabia; var. *indica* is known from the islands of the Indian Ocean and from continental tropical Asia and Malaysia. Var. *abyssinica* mainly differs from var. *indica* in its cordate-subtriangular long-acuminate leaves, with broad and less deeply cordate base, in its mostly shorter and slightly stouter peduncles and in its larger and more acute sepals.

[2]) I use the original name, given by SPANOGHE, for this species.

A glabrous or very sparsely, shortly and patently pilose twiner; stems thin, slender, terete, old stems with yellow, lacerate bark; leaves petiolate; petiole thin, 1—4 cm long; blade ovate to broad-ovate, shortly or long-acuminate at the apex with acute or obtusish, mucronulate point, widely to narrowly cordate at the base; the auricles rounded; upper and lower surface of the leaf generally glabrous, the margin sometimes shortly fimbriate; length of the blade 3.5—7.5 cm, width 2.5—5 cm. Inflorescences axillary, 1—several-flowered, cymosely branched, branches if present well-developed, prim. branches c. 1.5—2 cm; peduncles thin, glabrous or hairy with very short patent hairs, 3.5—5 cm; pedicels much longer than the calyx, smooth, glabrous or hairy like the peduncle, 1.5—3 cm; bracts minute, oblong or triangular; sepals glabrous, equal in length, oblong to ovate-oblong, with broadly rounded to truncate, slightly emarginate, mucronulate point, the outer ones with thick centre and thin, pale margins, the inner ones thinner; length of sepals 5—6.5 mm; corolla sulphur-yellow (SPANOGHE), c. 4 cm long, widely funnel-shaped, suddenly narrowed at the base into a short tube, the limb c. 5 cm in diam., glabrous, with exception of the apical parts of the midpetaline bands, which are pubescent; stamens and style included; stamens inserted 5—5.5 mm above the corolla base; filaments filiform, unequal in length, hairy at the dilated base; anthers oblong, sagittate, 4 mm long; ovary glabrous; style filiform, glabrous, articulate; stigma biglobular, papillose; capsule broad-ovoid, straw-coloured, crowned by the base of the style, 10—11 mm high, 4-valved, 2-celled, 4-seeded; seeds black, shortly brownish tomentose, c. 6 mm long (sepals reflexed in fruit, to 7 mm long).

TIMOR, without locality, REINWARDT 1358, Apr. 1821 (L); SPANOGHE n. Icon. 68 [1]) (L, *type*); Koepang, TEYSMANN s.n. (B); id., TEYSMANN 431 (L); S. Middle Timor, Kolbano, S. coast, on rocks near the sea, Mrs. WALSH 266, May 1929 (B).

Distribution: Timor.

Habitat: "on rocks near the sea" (always?).

16. Ipomoea stibaropoda VAN OOSTSTR., nov. spec. [2])

Planta herbacea, glabra, vel sparse pilosa, caulibus volubilibus, teretibus, gracilibus. Folia petiolata, petiolis glabris vel basin versus pilis nonnullis praeditis, 2—2.5 cm longis, late ovata vel orbicularia, 3.5—6 cm longa, 3—6 cm lata, apice breviter acuminata, basi profunde cordata, sinu rotundato, auriculis late rotundatis, margine integra, fimbriata, nervis lateralibus utrinque 5—6 ex quibus c. 3 e basi orientibus, utrinque

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[1]) In the Rijksherbarium at Leiden there is a coloured plate of this species, by SPANOGHE, numbered 68 and named *Ipomoea* (*Argyreia?*) *ochrolacea* SPAN.

[2]) Derived from στιβαρός-thick and firm, and πούς-foot.

glabra, prope marginem breviter pilosa. Inflorescentiae axillares, pedunculatae, 1- vel 2-florae, pedunculis brevibus, teretibus, glabris vel sparse pilosis, 5—14 mm longis; pedicellis calycem longe superantibus, crassis, erectis, deinde recurvatis, incrassatis, glabris, 15—18, in fructu ad 20—28 mm longis. Sepala crassiuscula, glabra, aequalia, 5—6 mm longa, exteriora ovato-oblonga, acutiuscula, mucronulata, margine angustissime scarioso, interiora latiora vel orbicularia, apice rotundata, mucronulata, margine scarioso latiore. Corolla flava, infundibuliformis, c. 4.5 cm longa; basi in tubum angustum c. 6—7 mm longum attenuata. Stamina exserta, filamentis circiter 7 mm supra basin corollae insertis, filiformibus, basi pauce dilatata breviter pilosa, antheris linearibus, oblongis, sagittatis, c. 4 mm longis. Discus annularis, c. $^{3}/_{4}$ mm altus. Ovarium glabrum, 2-loculare, stylo exserto, filiforme, c. 38 mm longo, glabro. Capsula (juvenilis) ovoidea, mucronata, glabra.

CELEBES, Celebes and Dependencies, Salajar Islands, marble-rock near T. Djampea, DOCTERS VAN LEEUWEN 1602, May 14, 1913 (B; U, *type*).

Distribution: Salajar Islands.

Habitat: Unknown.

Remarks. Though both the specimen in Utrecht and that in Buitenzorg are very fragmentary, I have no hesitation in saying that they represent a new species. This species seems to be closely related to *I. obscura* and *I. ochroleucea*, it is, however, characterized by its thick pedicels, which are erect in flower and afterwards turned down.

17. **Ipomoea maxima** (L. f.) DON in SWEET, Hort. Brit., ed. 2 (1830) p. 372; HOCHREUTINER in Candollea V (1934) p. 186 — *Convolvulus maximus* L. f., Suppl. (1781) p. 137 — *Ipomoea sepiaria* KOEN. ex ROXB., Fl. Ind. ed. CAREY & WALL., II (1824) p. 90; id., ed. CAREY, I (1832) p. 499; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 464; DECAISNE, Herb. Timor. (1835) p. 65; SPANOGHE in Linnaea XV (1841) p. 339; WIGHT, Icon. t. 838; CHOISY in DC., Prodr. IX (1845) p. 370; ZOLL., Syst. Verz., 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 612; BENTH., Fl. Austr. (1869) p. 422 [1]; (CLARKE [2]) in HOOK., Fl. Brit. Ind. IV (1883) p. 209; FORBES, Wander., Germ. ed. II (1886) p. 222; WATT, Dict. Econ. Prod. India IV (1890) p. 491; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 220; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1063; DUTHIE, Fl. Upper Ganget. Pl. (1911) p. 115; GAMBLE, Fl. Pres. Madras V (1923) p. 916; BACKER, Onkruidfl. Jav. Suikerrietgr.

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[1] BENTHAM describes the seeds as being glabrous.

[2] CLARKE describes a var. *stipulacea* (ROXB.) CLARKE (= *Convolvulus stipulaceus* ROXB.), which is unknown to me.

(1931) p. 527 — *I. verrucosa* BL., Bijdr. (1825) p. 718; SPANOGHE in Linnaea XV (1841) p. 340; CHOISY in DC., Prodr. IX (1845) p. 369; ZOLL., Syst. Verz., 2. Heft (1854) p. 129; MIQ., Fl. Ned. Ind. II (1857) p. 612; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 129; id. in Bull. Herb. Boiss. V (1897) p. 381; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; KOORDERS, Exk. fl. Java III (1912) p. 118 — *Convolvulus verrucosus* (BL.) DIETR., Syn. Pl. I (1839) p. 670 — *Ipomoea subtrilobans* MIQ., Fl. Ned. Ind. II (1857) p. 615.

A herbaceous perennial; stems few or several from a stout perpendicular root, twining or prostrate, 1—2.5 m long (BACKER), pale grey or olive-green, hirsute with white patent hairs, glabrescent or glabrous, longitudinally and transversely wrinkled. Leaves petiolate; petiole often shorter than the blade, glabrous or with some minute hairs, or minutely verrucose, 1—3 cm long; blade broad-ovate, orbicular or kidney-shaped, attenuate towards the apex or more or less abruptly acuminate with obtuse or acutish mucronulate acumen, mostly deeply cordate, sometimes slightly cordate or truncate at the base with broadly rounded auricles; the surfaces glabrous but with minute hairs along the margins above, often with purple margin or with purple spots; margin entire or slightly angular; length of blade (1—)2.5—6 cm, width (1—)2—5 cm. Inflorescences axillary, pedunculate, few- to several-(5—11-, BACKER) flowered; flowers aggregate in an umbellate cyme; peduncle thick, often applanate, minutely verrucose towards the top, variable in length, 1.5—12 cm long; pedicels verruculose, ¾—1 cm long; bracts small, persistent; sepals glabrous, elliptic-oblong, obtuse, minutely mucronate, the mucro somewhat below the top, the outer sepals verruculose, coriaceous with thinner margins, all of the same length or the interior ones slightly longer, 4—6 mm; corolla pale lilac or nearly white with purple centre, tubular to funnel-shaped, 20—25 mm long; the limb 1¼—2 cm in diam. (BACKER); stamens and style included; stamens inserted c. 3 mm above the corolla base; filaments unequal, filiform, glabrous except the dilated base; anthers ovate, 1.5—2 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; capsule depressed-globular, c. 6—7 mm high, glabrous, 4-valved, 2-celled, 4-seeded; seeds c. 3 mm long, covered with a dense, very short, pale greyish or white tomentum and with some longer arachnoid hairs along the edges.

MALAY PENINSULA, waste ground; Kedah, Malacca, Singapore (PRAIN, RIDLEY).

SUMATRA, East Coast, YATES 1255 (B).

JAVA. From West to East Java at low altitudes, mainly in the northern lowland, near the sea in moist, often somewhat saltish localities, by salines, but also on not saltish soil, moist grasslands, fields, thickets, borders of cane fields and along waysides (BACKER). Without locality, BLUME 88 (L); BLUME 1135 (L, *type of Ipomoea verrucosa* BL.[1]); KORTHALS 251 (L); Batavia, Batavia, VORDERMAN s. n. (B); id., in the *I. Pes-caprae* formation, near the old harbour, HALLIER s.n., Apr. 1895 (B); Tandjong Priok, KUHL & VAN HASSELT 63 (L); id., BACKER 34653, July 1903 (B); id., HALLIER s.n., Nov. 1894 (B); id., SCHIFFNER 2436a, July 1894 (L); id., along canal, RAAP 377, May 1894 (L); Tjilintjing, E. of Tandjong Priok, SCHEFFER s.n., Aug. 1871 (B); id., along fish-ponds, VAN STEENIS 524, Febr. 1928 (B); near Antjol, VAN STEENIS 6768, March 1935 (B); Rawah Embel, BACKER 34651, Jan. 1903 (B); Sentiong, BACKER 34650, Jan. 1903 (B); Chinese churchyard, N. of Weltevreden, HALLIER s. n., Aug. 1896 (B); Cheribon, Cheribon, BACKER 4759, Oct. 1912 (B); Haoer geulis, BACKER 16859, Oct. 1914 (B); Losarang, BACKER 16752, Sept. 1914 (B); Pekalongan, Tegal, BACKER 15270, Aug. 1914 (B, L); Semarang, Semarang, HORSFIELD s. n. (L, *type of I. subtrilobans* MIQ.; U); Bangkong, DOCTERS VAN LEEUWEN s. n., Apr. 1910 (B); Soerabaja, Soerabaja, DORGELO 3276, Febr. 1925 (Pa); id., JESWIET 721, May 1925 (W); Morokrembangan, VAN SLOOTEN 2026, Sept. 1928 (B); Kalang anjar near mud-volcano Gedangan, BACKER 26650, March 1919 (B); Malang, experiment field Ratji between Pasoeroean and Probolinggo, BIJHOUWER 141, Apr. 1931 (B); Loemadjang, ZOLLINGER 2676 ZM., Febr. 1845 (B); G. Semongkrong, VAN SLOOTEN 2426, Apr. 1931 (B); Kepoeh, S.W. of Pasoeroean, BACKER 36042, Apr. 1930 (Pa); Bangil, BACKER 7594, May 1913 (B); Pekoentjen, JESWIET 592, Nov. 1923 (W); id., JESWIET 622 (W); Besoeki, Ragadjampi, ZOLLINGER (107), Aug. 1858 (L); N. Banjoepoetih, near Asem Bagoes, BEGUIN 164, March 1922 (B); Madoera, Bangkalan, BACKER 19137, Febr. 1915 (B); Sampang, BACKER 19597, March 1915 (B); Soemenep, BACKER 20694, March 1915 (B); Kangean Islands, Kangean, Ardjasa, BACKER 27139, March 1919 (B); id., Kangean, S.E. of Ardjasa, BACKER 30023, May 1919 (B); id., Kangean, E.S.E. of Tambajangan, BACKER 27758, March 1919 (B); id., S.E. Paliat, BACKER 29538, May 1919 (B); id., Saboenten, BACKER 29672, May 1919 (B).

CELEBES, Celebes and Dependencies, Djeneponto, Mrs. BOUMAN—HOUTMAN 72, May 1926 (B).

LOMBOK, Rindjani, N. side, Laboean tjarik, ELBERT 633, Apr. 1909 (L).

TIMOR, without locality, SPANOGHE s. n. and 89 (L); S. Middle Timor, Soë, Mrs. WALSH 126[2]), Febr. 1929 (B).

Distribution: British India, Ceylon, eastward to Indo-China, Hainan, Formosa, the Malay Peninsula and the Malay Archipelago.

Habitat: In moist, often somewhat saltish localities, near salines, on beaches, but also in moist grasslands, in fields, thickets, hedges, waste ground and along waysides; between 0 and 50 m.

Use: See WATT, l. c.

Remarks. 1. *Convolvulus maximus* L. f. seems to be the oldest name for this species. In ROXBURGH's Flora Indica it has been described as *Ipomoea sepiaria*. *Tiru tali* of RHEEDE (RHEEDE, Fl. Malab. 11, p. 109, t. 53) is according to ROXBURGH certainly identic with this species and ROXBURGH supposes that it is also identic with *Convolvulus maximus* L. f. LINNAEUS f. cites *Tiru tali* of RHEEDE as a synonym of his *C. maximus*. Concerning *I. verrucosa* BL. which I consider as a synonym I can state that I do not see any important difference between the specimens from British India, undoubtedly belonging to *I. sepiaria* and the type of *I. verrucosa* BL.

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[1]) The specimen was originally named *I. rugosa* BL. and bears this name in BLUME's handwriting. Afterwards the name has been changed into *I. verrucosa*.

[2]) This specimen has the leaves ovate-oblong with sagittate base.

2. Some authors [1]) have mentioned this species as *I. sagittaefolia* BURM. f. (Fl. Ind., 1768, p. 50, t. 18, fig. 2), a species which is unknown to me. The plate of BURMAN does not agree very well with *I. maxima*. According to HOCHREUTINER the type specimen of *I. sagittaefolia* in the herbarium of BURMAN at Geneva, belongs to *I. reptans* (= *I. aquatica* FORSK.).

18. Ipomoea aquatica FORSK., Fl. Aeg.-Arab. (1775) p. 44; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 210; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; WATT, Dict. Econ. Prod. India IV (1890) p. 476; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 221; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 170; HALL. f. in VALETON, Pl. Pap. in Bull. Dep. Agric. Ind. Néerl. X (1907) p. 50; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 248 — *Convolvulus repens* VAHL, Symb. I (1790) p. 17 (non L.); ROXB., Fl. Ind. ed. CAREY, I (1832) p. 482; BLANCO, Fl. Filip. ed. 1 (1837) p. 92; id., ed. 2 (1845) p. 68; id., ed. 3, I (1877) p. 128, t. 149; MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 62 (*C. repens* BLANCO); id., Spec. Blanc. (1918) p. 324 — *Ipomoea reptans* POIR. in LAMK., Encycl., Suppl. III (1814) p. 460, non *Convolvulus reptans* L. [2]); BL., Bijdr. (1825) p. 714; CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 444; SPANOGHE in Linnaea XV (1841) p. 339; CHOISY in DC., Prodr. IX (1845) p. 349; ZOLL., Syst. Verz. 2. Heft (1854) p. 128; MIQ., Fl. Ned. Ind. II (1857) p. 601; BENTH., Fl. Austr. IV (1869) p. 420; HILLEBR., Fl. Hawaiian Isl. (1888) p. 314; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 143; id., Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 380; id. in

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[1]) PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 317; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 260; RIDLEY, Fl. Malay Penins. II (1923) p. 461; HENDERSON in Gardens' Bull. Str. Settlem. IV (1928) p. 293.

[2]) See MERRILL in Philipp. Journ. Sc. LIX (1936) p. 451, 452.

Meded. 's Lands Pl. t. XIX (1898) p. 544; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 511; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1062; HALL. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 316; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 114; KOORDERS, Exk. fl. Java III (1912) p. 118; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 444; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510; GAMBLE, Fl. Pres. Madras V (1923) p. 916; RIDLEY, Fl. Malay Penins. II (1923) p. 462; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 368; HEYNE, Nutt. Pl., ed. 2 (1927) p. 1305; MERRILL in Univ. Calif. Publ. Bot. 15 (1929) p. 260; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 526; OCHSE & BAKHUIZEN VAN DEN BRINK, Ind. Groenten (1931) p. 160, fig. 97; VAN STEENIS in Arch. Hydrobiol., Suppl. XI (1932) p. 322, fig. 61; COERT in Trop. Nat. XXIII (1934) p. 29, fig. 14 — *I. repens* ROTH, Nov. Pl. Sp. (1821) p. 110, as to the description, not *Convolvulus repens* L., nor *I. repens* LAMK.; BL., Bijdr. (1825) p. 713; (?) SPANOGHE in Linnaea XV (1841) p. 339 — ? *Convolvulus rostratus* ZIPP. in Linnaea XV (1841) p. 339, pro syn. — *Ipomoea subdentata* MIQ., Fl. Ned. Ind. II (1857) p. 614.

Herbaceous, perennial or sometimes annual (see remarks); stems thick, terete or striate, hollow or spongy, rooting at the nodes, up to 2 or 3 m long, trailing on moist soil or mud or floating on water, occasionally twining, entirely glabrous or hairy at the nodes; no subterraneous tubers [1]). Leaves petiolate; petiole thick, glabrous, shorter or longer than the blade, 3—20 cm; blade glabrous, green above, pale green beneath, variable in form and size, ovate, triangular, ovate-oblong, lanceolate or linear, acute or obtuse to retuse and mucronulate at the apex, truncate, cordate to sagittate or hastate at the base, with rounded or with acutish or acute, entire or dentate auricles, the leaf margin above the auricles entire or coarsely dentate; length of the blade 3—15 cm, width 1—9 cm. Inflorescences axillary, pedunculate, cymosely 1—few-flowered; peduncle glabrous, thinner than the petiole, 1—12 cm long; pedicels longer than the calyx, glabrous, 20—65 mm long; bracts minute, narrow, acute, 1.5—2 mm long; sepals with thin, pale margins, glabrous, equal in length or the exterior ones a little shorter, the exterior ones ovate-oblong, obtuse, minutely mucronate or blunt, 7—8 mm long, the interior ones ovate-elliptic, obtuse, minutely mucronate, c. 8 mm long; corolla pink or pale lilac, often with a purple centre, rarely entirely white, funnel-shaped, 3—5 cm long, with a c. 4.5—5 cm broad limb

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[1]) The species is easily propagated by cuttings.

(Backer, Lörzing), or in poorly developed specimens only 2.5 cm long, glabrous, the tube slightly constricted at the base at the place of insertion of the filaments; stamens and style included; stamens inserted c. 3 mm above the corolla base; filaments filiform, unequal in length, hairy at the dilated base; anthers oblong, sagittate, c. 3 mm long; disk annular; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; capsule ovoid, glabrous, c. 8—10 mm high, 4- or less-seeded; seeds densely pubescent.

Malay Peninsula. Extensively cultivated as a vegetable (Ridley).

Sumatra, Atjeh and Dependencies, Poeloe Wé, Sabang, Backhuys s. n., herb. v. O. 4062, Oct. 1930 (L); id., shore of Anak laoet, partly submerged, van Steenis 18, Dec. 1927 (B); East Coast, Yates 1126 (B); Medan, Lörzing 3273, Oct. 1914 (B); Sibolangit, cult., Lörzing 5535, Febr. 1918 (B, L); Betimoes valley, probably cult., Lörzing 5713, June 1918 (B, L, U); E. of Loeboek pakam, Lörzing 3300, Oct. 1914 (B); West Coast, Ophir District, Taloe, Bünnemeyer 87, Apr. 1917 (B); Benkoelen, Enggano Island, near Apiko, Lütjeharms 5379, July 1936 (B, L); Lampong Districts, Sebesi Island, Docters van Leeuwen 5423, Apr. 1921 (B); Palembang, Moeara Doea, spontaneous and cult., Grashoff 470, June 1915 (B); Djambi, Bangko, Posthumus 494, July 1925 (B, L); Riouw and Dependencies, Riouw Archipelago, P. Doerian, Bünnemeyer 7743, Sept. 1919 (B); Lingga Archipelago, P. Lingga, G. Tanda, cult., Bünnemeyer 6864, July 1919 (B).

Java. From West to East Java, at low and medium altitudes, in moist, marshy or inundated localities, wild or cultivated (Backer). Without locality, Blume 1075 (L); Junghuhn 39, 53 (L); Korthals s. n. and 260, 261 (L); Bantam, Danoe, Koorders 40565 β, May 1912 (B, L); id., Koorders 40823 β, May 1912 (B); between Malingping and Penjawoengan, Backer 1534, June 1911 (B); Batavia, Batavia, Blume 77 (L); Tandjong Priok, Backer 32336, July 1903 (B); G. Sahari Sentiong, between Batavia and Weltevreden, Backer 32335, May 1902 (B); lake of Tjigombong, Miss Polak s. n., March 1930 (B); Buitenzorg, Buitenzorg, Boerlage 138, Oct. 1888 (L); Pantar Pete, cult., Zollinger 2118 (according to Zollinger); Tjiboerial, van Steenis 1497, May 1928 (B); Soekaboemi, Backer 14909, July 1914 (B); Priangan, Garoet, Koens 514, May 1913 (B); Cheribon, Karang Ampel, Backer 16669, Sept. 1914 (B); Pekalongan, Brebes, Backer 15316, Sept. 1914 (B); between Soebah and Weleri, Backer 16558, Sept. 1914 (B); Banjoemas, between Banjoemas and Kroja, Koorders 20868 β, Oct. 1915 (B); Semarang, Banjoebiroe, Rawa pening, Koorders 36224 β, 36226 β, May 1899 (B); id., Backer 30201, March 1920 (B); Randosarie, Docters van Leeuwen s. n., July 1910 (B); Djapara-Rembang, Ngarengan, Koorders 35606 β, June 1899 (B); Soerakarta, Horsfield s.n. (L; U, *type of I. subdentata* Miq.); Soerabaja, Soerabaja, Dorgelo 332, May 1922 (Pa); Madioen, Madioen, Wisse s.n. (B); Kediri, Teloengagoeng, Lörzing 1001, Febr. 1914 (B); Malang, Pasoeroean, Jeswiet 6, Aug. 1913 (B); S. of Bantoer, Backer 3829, June 1912 (B); Djatiroto, Backer 7823, May 1913 (B, Pa); Ranoe Lamongan, Ruttner 336, Nov. 1928 (B); near Soember mandjong, Koorders 23449 β, June 1896 (B); Pekoentjen, Jeswiet 212, Nov. 1922 (W); id., Jeswiet 225, March-May 1923

(W); Besoeki, between Poeger and Amboeloe, Backer 18177, Dec. 1914 (B); Djember, Ultée s.n. (B); S. of Djember, Backer 18362, Dec. 1914 (B).

Borneo, S. and E. Division, Bandjermasin, Korthals 258, 259 (L); Samenggaris, Amdjah 1086, Oct. or Dec. 1912 (B, L); British North Borneo, Elphinstone Prov., Tawao, Elmer 20786, Oct. 1922—March 1923 (B, U).

Celebes, Celebes and Dependencies, Lake Tempe, Noerkas 367 (exped. van Vuuren), Dec. 1912 (B, L); Manado, near Pakoe-oere, Koorders 16562 β, Apr. 1896 (B); Talaud Islands, Salibaboe, marsh Lota near Morongo, rather rare, Lam 3219, May 1926 (B).

Soembawa, Soembawa besar, Mrs. Rensch 540, May 1927 (B).

Moluccas, Ceram, W. Ceram, Way Poeloe Tikoes, Kornassi 1263, May 1918 (B, L, U); Banda, without coll. name, no data (L).

New Guinea, Netherlands New Guinea, Etnabay, Koch s. n., Aug. 1904 (B, L); E. of Merauke, Koch 2, Sept. 1904 (L).

Philippine Islands. "This species is common and widely distributed in the Philippines at low and medium altitudes, growing in open muddy places, shallow pools, etc." (Merrill). Luzon, Rizal prov., Manila, Merrill, Bur. of Sc. 5168, Febr. 1906 (B, L); id., id., Merrill, Spec. Blanc. 427, Nov. 1914 (B, L).

Distribution: Tropical America, tropical Africa, tropical Asia, N. Australia.

Habitat: In moist, marshy or inundated localities, in shallow pools, ditches, wet rice-fields, also along waysides, wild and cultivated; between 0 and 1000 m.

Vernacular names: See Heyne, Nutt. Pl., l. c. p. 1305. Further names are: sajoran lalap (the leaves, Lingga Archipelago, Bünnemeyer); daoen deli dili di (Djambi, Posthumus); laraë (Celebes, lake Tempe, Noerkas); tanidri (Celebes, Makassar, Miquel); pintoer (id., Manado, Tontemboan language, Koorders); sajor kangkong (Ambon, Miquel); baláñgög, galatgat (Philippines, Ilóko language, Merrill); kangkung, tankúng (Philippines, Súlu language, Merrill); kangkóng (Philippines, Bíkol, Tagálog and Pampángan language, Merrill); tangkóng (Philippines, Ilóko, Kuyónon and Bisáya language, Merrill). Also see de Clercq—Pulle, Nieuw·Plantk. Woordenb. ed. 2 (1927) p. 126.

Use: Used as a pot herb, especially the young shoots and leaves. Also used as fish-food. See Watt, Heyne and Ochse & Bakhuizen van den Brink, l.l. c.c.

Remarks. 1. According to Backer l. c. this species is perennial, or sometimes, in unfavourable localities, annual. Otto Kuntze states (Rev. Gen. Plant. II, 1891, p. 446) that it occasionally produces cleistogamic flowers, with fruits riping in the mud. Backer, the well-known specialist of the flora of Java, never saw such flowers (Backer, Onkruidfl. p. 527).

2. A specimen from Rotti, mentioned by Spanoghe in Linnaea XV

(1841) p. 339, as *Ipomoea repens* Roth, is unknown to me. Spanoghe cites *Convolvulus rostratus* Zipp. as a synonym.

3. Ochse & Bakhuizen van den Brink mention two forms viz. kankoeng biasa (Sund.) with dark green leaves and stems and lilac flowers and kankoeng nagri (Sund.) with yellow-green leaves, yellowish stems and white flowers.

4. Hochreutiner (in Candollea V, 1934, p. 186) states that the specimen of *Convolvulus sagittaefolius* Burm. (published by Burman as *Ipomoea sagittaefolia*) in Burman's herbarium is identic with *Ipomoea reptans* (= *I. aquatica* Forsk.). If Hochreutiner is right, the specific name *sagittaefolia* has priority as Burman published the name *I. sagittaefolia* in 1768 (Burm. f., Fl. Ind., 1768, p. 50, t. 18, fig. 2).

5. The specimens Dorgelo 332, from Soerabaja and Jeswiet 6, from Pasoeroean have very narrow (3—6 mm broad) sagittate leaves.

19. Ipomoea Pes-caprae (L.) Sweet, Hort. Suburb. Londin. (1818) p. 35; Choisy in DC., Prodr. IX (1845) p. 349; Zoll., Syst. Verz. 2. Heft (1854) p. 128; Miq., Fl. Ned. Ind. II (1857) p. 602; Benth., Fl. Austr. IV (1869) p. 419; Forbes, Wander., Germ. ed. II (1886) p. 222; Hillebr., Fl. Hawaiian Isl. (1888) p. 313; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 145; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 376, 381; id. in Meded. 's Lands Pl. t. XIX (1898) p. 543; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512; Schum. & Lauterb., Fl. Deutsch. Schutzgeb. (1901) p. 517; Manson Bailey, Queensl. Fl. IV (1901) p. 1061; Hall. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675; Prain in Journ. As. Soc. Bengal LXXIV (1906) p. 315; Merrill in Philipp. Journ. Sc. I, Suppl. (1906) p. 120; Koorders, Exk. fl. Jav. III (1912) p. 117; Koorders-Schum., Syst. Verz. I (1910—13) Conv. p. 5; Merrill, Interpr. Rumph. Herb. Amb. (1917) p. 444; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510; Gamble, Fl. Pres. Madras V (1923) p. 917; Ridley, Fl. Malay Penins. II (1923) p. 460; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 366; Rendle in Journ. Bot. LXIII, Suppl. (1925) p. 71; Ridley in Kew Bull. (1926) p. 74; Heyne, Nutt. Pl., ed. 2 (1927) p. 1304; Jochems in Trop. Nat. XVIII (1929) p. 166—170, fig. 6, 7; Backer, Onkruidfl. Jav. Suikerrietgr. (1931) p. 528; van Steenis in Trop. Nat. XXIV (1935) p. 31, 32, fig. 3; id. in Trop. Nat. l. c. p. 121; Booberg in Handel. 7e N. I. Natuurw. Congres (1936) p. 403; Docters van Leeuwen in Ann. Jard. Bot. Buitenz. XLVI—XLVII (1936) p. 406; van Steenis in Trop. Nat. XXVI (1937) p. 70; id., l. c. p. 156; id., l. c. XXVII (1938) p. 142; id., l. c. XXVIII (1939) p. 145 — *Convolvulus*

Pes caprae L., Spec. Pl. ed. 1 (1753) p. 159; ROXB., Fl. Ind., ed. CAREY, I (1832) p. 486 — *Ipomoea biloba* FORSK., Fl. Aegypt.-Arab. (1775) p. 44; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 212; SCHUM. in ENGL., Bot. Jahrb. IX (1887) p. 216; SCHUM. & HOLLR., Fl. Kais. Wilhelms Land (1889) p. 114; WATT, Dict. Econ. Prod. India IV (1890) p. 482; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 412; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 224; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 172; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 259; BACKER in Trop. Nat. VII (1918) p. 55, fig. 8 — *Convolvulus maritimus* DESR. in LAMK., Encycl. Bot. III (1789) p. 550 — *Ipomoea maritima* (DESR.) R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 486; BL., Bijdr. (1825) p. 720; SPANOGHE in Linnaea XV (1841) p. 340.

This species can be subdivided into 2 subspecies, viz. ssp. *Pes-caprae* (L.) VAN OOSTSTR. and ssp. *brasiliensis* (L.) VAN OOSTSTR. The former seems to be restricted to the coasts of continental tropical Asia, a few localities on the East African coast and one or two localities in Malaysia; the latter is circumtropical and is the common form in Malaysia.

ssp. **brasiliensis** (L.) VAN OOSTSTR., nov. ssp. — *Convolvulus brasiliensis* L., Spec. Pl. ed. 1 (1753) p. 159 — *Ipomoea brasiliensis* (L.) G. F. W. MEY., Prim. Fl. Esseq. (1818) p. 97 — *Convolvulus bilobatus* ROXB., Fl. Ind., ed. CAREY & WALL., II (1824) p. 73; id., ed. CAREY, I (1832) p. 485 — *Ipomoea Pes-caprae* (L.) SWEET var. *emarginata* HALL. f. in Bull. Soc. Roy. Bot. Belg. XXXVII (1898) p. 98; id. in Ann. R. Istit. Bot. Roma VII (1898) p. 231; id. in Bull. Herb. Boiss., sér. 2, I (1901) p. 675.

Perennial; stems from a thick woody base, long-trailing and rooting at the nodes, or occasionally twining, 5—30 m long (BACKER), terete or angular, or often flattened, glabrous, containing a milky juice. Leaves often secund, petiolate; petiole glabrous, up to 12(—17) cm long; blade ovate, obovate, elliptic, orbicular or transverse-elliptic to kidney-shaped or quadrangular to oblong, emarginate or sometimes truncate at the apex, mucronulate; truncate, rounded, short-attenuate into the petiole to subcuneate or slightly cordate at the base, rather thick and firm, subcoriaceous, glabrous, 3—10 cm long, 3—10.5 cm broad; midrib below with 2 glands at the base of the leaf-blade [1]), lateral nerves 8—10 on each side of the midrib. Inflorescences axillary, secund; the peduncles stout, angular or flattened, 3—16 cm long, glabrous, 1-flowered or cymosely branched and few- to several-flowered, primary branches of the cyme short or elongate, 1—7 cm; pedicels longer than the sepals, glabrous, 12—30, in fruit to 45 mm long; bracts small, ovate-lanceolate, 3—3.5 mm long, deciduous; sepals subequal or the exterior ones a little shorter, exterior ones ovate to elliptic, or broad-elliptic, interior ones broader, to orbicular and very concave, all obtuse and mucronulate, subcoriaceous, glabrous, the exterior ones distinctly 3—5-nerved; exterior sepals 5—8, interior ones 7—11 mm long; corolla funnel-shaped, glabrous, pink, reddish purple or violet, darker inside at the base (rarely entirely white), 3—5 cm long; stamens and style included; stamens inserted c. 4 mm above the corolla base; filaments filiform, unequal in length, hairy at the dilated base; anthers oblong, sagittate, c. 4.5 mm long; ovary glabrous; style filiform; stigma biglobular, papillose; capsule globular, c. 12—15 mm high, glabrous, 4-valved, 2-celled, 4-seeded; valves thick, brown outside, whitish inside; seeds black, densely brownish tomentose, 6—7 mm long.

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[1]) See NIEUWENHUIS — VON ÜXKÜLL-GÜLDENBANDT in Ann. Jard. Bot. Buitenz. XXI (1907) p. 255, t. 26, fig. 59.

Malay Peninsula, common on all sandy sea-shores (Ridley), occasionally in the interior. About an inland collection from Negri Sembilan, Ridley, 1923, says: "I found a patch of this sea-shore plant on a cart track in the Bukit Tangga Pass in Negri Sembilan; perhaps the seed has been brought up in a cart of sea sand. It was flowering and fruiting here, many miles from the sea." Perak, Pulau Lalang, Seimund s. n., Nov. 1925 (B); Pahang, Pulau Tioman, Pulau Tulai, Henderson, Singapore Field n. 18503, May 1927 (B). Perlis, Kelantan, Penang, Malacca, Singapore (Ridley).

Sumatra, Atjeh and Dependencies, Poeloe Wé, E. of Sabang, van Steenis 15, Dec. 1927 (B); Simaloer, Achmad 475, June 1918 (B, L); East Coast, Belawan, Bijhouwer 229, July 1930 (B); Serdang, near Rantau pandjang, Lörzing 3674, March 1915 (B); Pantai tjermin, Lörzing 9199, Nov. 1922 (B); P. Berhala, van der Meer Mohr 5, Aug. 1926 (B); id., Lörzing 6934, Nov. 1919 (B); Tapanoeli, Batoe Islands, Raap 97, Sept. 1894 (B); West Coast, Padang, v. d. Ker (?) 227, March 1869 (B); Mentawai Islands, Siberoet (according to Ridley, 1926); Benkoelen, Enggano Island, Kiojoh, Lütjeharms 4698, June 1936 (B, L); id., P. Bangkei, Lütjeharms 5141, June 1936 (B, L); Lampong Districts, Telok Betong, Backer s. n., May 1908 (B); Tandjoeng Rata, Backer 32328, Apr. 1906 (B); Krakatau, Backer 32325, Apr. 1906 (B); id., Zwarte Hoek, Backer 35332, May 1908 (B); id., id., Docters van Leeuwen 3720, Apr. 1919 (herb. D. v. L.); Anak Krakatau, seedling, very frequent, Boedijn 2089, Nov. 1932 (B); id., seedling, Docters van Leeuwen 14759, May 1932 (B); Lang Island, Boerlage s. n. (B); id., Boerlage 11, 28, 32, Sept. 1896 (B); id., Nolthenius s. n. (B); id., Backer 35331, May 1908 (B); Verlaten Island, Backer 35330, May 1908 (B, L); id., Docters van Leeuwen 11623, Febr. 1928, with witches' broom (herb. D. v. L.); Riouw and Dependencies, Riouw Archipelago, Batoe Hitam, P. Bintan, Bünnemeyer 6402, June 1919 (B, L); Lingga Archipelago, P. Sebangka, Bünnemeyer 7481, Aug. 1919 (B, L); Anambas and Natoena Islands, Boengoeran, Ranai, van Steenis 1319, Apr. 1928 (B, L); Bangka, S. W. coast, Bünnemeyer 2478, Dec. 1907 (B); Tandjong Kalian near Muntok, Bünnemeyer 1545, Oct. 1907 (B).

Java, from West to East Java, on and directly behind sandy sea shores; occasionally inland, along waysides, dikes and canals (Backer). Without locality, Blume 61, 1685 (L); Junghuhn 11 (L); Ploem s. n. (B); Bantam, Prinseneiland, Keulemans s. n. (L); Java's 1e punt, Backer 32323, Apr. 1906 (B); between Pasaoeran and Anjer, Backer 7227, March 1913 (B); Djoengkoelon, coll. indig. s. n. (B); Batavia, Batavia, Vorderman s. n. (B); id., near old harbour, frequent, Backer 32320, June 1902 (B); id., id., Hallier s. n., Apr. 1895 (B); Tandjong Priok, open sunny places near harbour, frequent, Backer 32321, Apr. 1903 (B); id., near harbour, frequent, Backer 32304, May 1908 (B); id., beach, Backer 32322 (*fl. albo*), Apr. 1905 (B); id., id., Bakhuizen van den Brink 1432, July 1922 (B); along canal near Tandjong Priok, Raap 384, June 1894 (L); Tjilentjing near Tandjong Priok, near fish-ponds, van Steenis 543, Febr. 1928 (B); id., Visser s.n., March 1929 (L); id., between pier and lighthouse, Backer 30970, Nov. 1920 (B); Antjol, dike of fish-pond, van Harreveld s.n., June 1907 (Pa); Weltevreden, dike of canal, Backer 32319, May 1902 (B); island Edam, Boschma 230, Dec. 1921 (B); id., Backer 32324, Apr. 1906 (B); id., near lighthouse, Boschma 131, 231, Dec. 1921 (B); id., S. beach, Boschma 155, Dec. 1921 (B); id., silt, Boschma 282, Dec. 1921 (B); island Haarlem, van Steenis 6813, Apr. 1935 (B); island Leiden, Went s.n., May 1890 (L); Duizend eilanden (Thousand Islands), Noordwachter, S. part, Boschma 14, van Slooten & Backer 35045, Sept. 1921 (B); Buitenzorg, Pelaboean Ratoe, Junghuhn 10 (L); id., Boerlage s.n. (L); id., Backer 2289, Febr. 1912 (B); id., Tjisolok, Winckel s.n., Nov. 1917 (B, L); Tjidaoen, Koorders 34659 β, Apr. 1899 (B); Buitenzorg, cult. in the Botanic Garden, Hallier C 6, Apr. 1893 (L); id., Pulle s.n., May 1906 (U); id., n. XV. K. B. XI. 12 (B, Pa); Pekalongan, between Slawi and Balapoelang, dike of tramway, 50—100 m, Backer 15410, Sept. 1914 (B); between Pemalang and Pekalongan, Backer 15679, Sept. 1914 (B); Tegal, Backer 15262, Aug. 1914 (B); Koerapan Soebah, Koorders 27337 β, Apr. 1897 (B); Banjoemas, Karangbolong, Koorders 29684 β, Febr. 1898 (B, L); Noesa Kambangan, Koorders 27051 β, Febr. 1897 (B; L, mixed with *I. illustris* (Clarke) Prain); id., S. coast, Wolf von Wülfing W. 74, March 1921 (B); id., near Karang Tengah, van Straelen 21, Apr. 1918 (B); Pekalongan or Semarang, between Soebah and Weleri, Backer 16589, Sept. 1914 (B); Semarang, near mouth of Kali Bajoran, Beumée A. 182, May 1919 (B); Karimoendjawa Islands, Karimoendjawa, Karta 300, Nov. 1930 (B); id., Bangkoang, Koorders 134 (B); Sintok, Koorders 242 (B); Djapara-Rembang, Ngarengan, Koorders 35598 β, May 1899 (B); id., teak-wood on red volcanic soil, 3—4 km from the beach, 50 m, Beumée 3642, Dec. 1918 (B); Kragan, Beumée A. 238, Jan. 1921 (B); Pasokan, Koorders 32921 β, June 1899 (B); Jogjakarta, S. coast, Parangtritis, dunes, 5 m, Beumée A. 90, Oct. 1918 (B); dunes near Parangtritis (according to Lütjeharms[1])); Madioen, Patjitan, Backer 2895, Apr. 1912 (B); Kediri, Prigi, Backer 11802, Febr. 1914 (B); Soerabaja, Bawean, along rice fields, Karta 55, May 1928 (B, L, U); id., Sangkapoera, Karta 7, June 1928 (B); Malang, W. of mouth of Kali Srigontjo, Backer 4028, June 1912 (B); S.E. foot of G. Semongkrong, wayside, a few km from the sea, locally frequent, 10 m, Backer 36844, Jan. 1930 (Pa); S. coast, Buysman 208, Aug. 1907 (U); Besoeki, E. of Besoeki, Backer 24511, June 1918 (B, L); Petjaron, Backer 24658, June 1918 (B); Boma, Koorders 28893 β, Aug. 1897 (B, L); Poeger, Backer 17805, Dec. 1914 (B); id., Beumée A. 68, Aug. 1918 (B); Batoe oelo, Clason s.n., Aug. 1930 (Pa); Asem Bagoes, Backer 37151, Nov. 1926 (Pa); Madoera, Bangkalan, grasslands and waysides near the sea, frequent, 1—5 m, Backer 19125, Febr. 1915 (B); E. of Sampang, Backer 19796, March 1915 (B); Sapoeloeh, Jeswiet 1034, Aug. 1925 (W); id., Backer 19489, Febr. 1915 (B); Tamberoe, Vorderman 67 (B); E. of Tamberoe, Backer 20577, March 1915 (B); P. Poeteran, N. and S. side, Backer 20776, March 1915 (B); Kangean Islands, Kangean, N. of Ardjasa, Backer 26761, March 1919 (B); id., id., Kajoe Waroe, Backer 28070, Apr. 1919 (B); id., id., Djoekoeng djoekoeng, Backer 27573, March 1919 (B); id., P. Mamboerit, Backer 27260, March 1919 (B); id., Paliat, Backer 29356, May 1919 (B); id., Saoebi, Backer 28363, Apr. 1919 (B); id., Saboenten, Backer 29818, May 1919 (B); id., Sapapan, Backer 28466, Apr. 1919 (B); id., Saseël, Backer 28729, Apr. 1919 (B); id., Sepandjang, Backer 28820, Apr. 1919 (B).

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[1]) Lütjeharms in Trop. Nat. XXVI (1937) p. 88, fig. 6.

Borneo, S. and E. division, Balikpapan, Rutten 64, May 1910 (U); Pembeliangan, Amdjah 812, Oct. 1912 (B, L, U); Sarawak (according to Merrill, 1921).

Celebes, without locality, de Vriese & Teysmann 24, 216 (L); Celebes and Dependencies, Papang, Rachmat 247 (exped. van Vuuren), July 1913 (B, L); Madjene, Rachmat 137 (exped. van Vuuren), July 1913 (B); Kendari, Kjellberg 1228, Apr. 1929 (B); Salajar, Docters van Leeuwen 1865, May 1913 (B, U); id., S. Salajar, W. side, Barang-barang, seedlings, Docters van Leeuwen 1909, May 1913 (B); Boeton, Konkeong Rea, on limestone and red loam, 200—300 m (probably incorrect), Elbert 2832, 6817, 6818, 6819, Nov. 1909 (L); id., P. Kabaena, de Boer, Forestry Experiment Station, BB. 3642, June 1921 (B); Manado, Likoepang, Forsten 12, Sept. 1840 (L); Kedoenggala, Koorders 16572 β, Dec. 1894 (B, L); Ratatotok, Koorders 16571 β, 16573 β, March 1895 (B, L); Karoewatoe, Koorders 16586 β, March 1895 (B, L); Talaud Islands, Karakelang, S. of Beo, Lam 2479, Apr. 1926 (B).

Bali, way Kintamani—Den Pasar, waysides, dikes of rice-fields, c. 2.5 km from the coast, van Steenis 8130, Apr. 1936 1) (B).

Lombok. The numbers 1513 and 2477 (L) collected by Elbert in Lombok are very probably wrongly labeled (Rindjani, N. E. side, Sembaloen-plateau, 1185—1265 m, Elbert 1513, May 1910 (L) and Mount Sepi, on limestone, 0—300 m, Elbert 2477, July 1909 (L)).

Soembawa, S. E. Bima, Oei-oet, S. E. slope to Waworadabay, on limestone, Elbert 3905, Dec. 1909 (L); W. Soembawa, Lenanggoear, river bank, 30 km from the coast, 300 m, de Voogd 2571, June 1936 (B).

Timor, S. Middle Timor, Kolbano, Mrs. Walsh 364, Apr. 1929 (B).

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1) A fruiting specimen; see van Steenis, *Ipomoea pes caprae* met vruchten in het binnenland, in Trop. Nat. XXVI (1937) p. 70—72.

MOLUCCAS, Ternate, Doefa doefa, BEGUIN 911, Oct. 1920 (B); Obi, SAÄNAN 74 (exped. VAN HULSTIJN) (B, L); Ceram, between Seti and Kobi, RUTTEN 383, Oct. 1917 (B); Pasir poetih, fields behind the beach, frequent, KORNASSI 191, Oct. 1917 (B, L, U); Wai Kapoetih, RUTTEN 1741, Oct. 1918 (B, L, U); Kilmoeri, KORNASSI 783, Jan. 1918 (B, L, U); Ambon, ROBINSON 400, July—Nov. 1913 (B, L); Banda, coll. unknown (L); Kai Islands, Elat, JENSEN 142, Apr. 1922 (B, L).

NEW GUINEA, Netherlands New Guinea, without locality, KOCH A 7b (L); Schouten Islands, Biak, N. coast, FEUILLETAU DE BRUYN 294, Aug. 1913 (B); Hollandia, GJELLERUP 146, May 1910 (B); Territory of New Guinea, Finschhafen, HOLLRUNG 181 (B); Hatzfeldthafen; Constantinhafen; Huon Bay (SCHUMANN); Papua, Hisiu, CARR 11418, Febr. 1935 (L); W. Division, Daru Island, trailing on a low ridge of drift sand within mangroves, BRASS 6231, Febr. 1936 (L); Port Moresby (according to VON MUELLER, Pap. Pl. V, 1877, p. 91).

BISMARCK ARCHIPELAGO, New Britain (according to SCHUMANN & LAUTERBACH).

PHILIPPINE ISLANDS. "It occurs throughout the Philippines along the seashore, a characteristic species of the sandy beaches; also along the shores of some lakes." (MERRILL). Luzon, AHERN 299 Q (B); id., Cagayan prov., Aparri, MERRILL 334, June 1902 (B); Union prov., Bauang, ELMER 5649, Febr. 1904 (B); Bataan prov., Lamao River, Mt. Mariveles, MEYER, For. Bur. 2293, Dec. 1904 (B); Rizal prov., Manila, MERRILL, Spec. Blanc. 105, Nov. 1914 (B, L); Sorsogon prov., Irosin, ELMER 16768, July 1916 (B, L, U); Basilan, REILLO s. n., Sept. 1912 (L).

Distribution: Circumtropical.

Habitat: On and immediately behind sandy sea-shores, occasionally in the interior ¹) along waysides, ditches and canals.

Vernacular names: See HEYNE, Nutt. Pl., l.c. p. 1304. Further names are: geitepoot (Dutch); tepah kudah (Malay Peninsula, RIDLEY); balaleun (Sumatra, Simaloer, ACHMAD); tatosan (Sund., Sumatra, Lang Island, BOERLAGE); doan tapa koeda (Sumatra, Riouw Arch., BÜNNEMEYER); tjap koeda (Sumatra, Lingga Arch., BÜNNEMEYER); daoen barah (Sumatra, Anambas and Natoena Islands, VAN STEENIS); tatapajan (Java, Batavia, RAAP); boboledan (Sund., Java, Preanger, KOORDERS, WINCKEL); korak (Jav., Java, Banjoemas, KOORDERS); balaran (Jav., Java, Pekalongan, KOORDERS); belaran poetih, korakan (Jav., Java, Banjoemas, KOORDERS, VAN STRAELEN); katang (Jav., Java, Djapara-Rembang, KOORDERS); katang-katang (Karimoendjawa Islands, Bawean, KARTA; Kangean Islands, BACKER); loendo (Bawean, KARTA); tjalere (Celebes,

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¹) Cf. RIDLEY, Fl. Malay Penins. II (1923) p. 460 (Malay Peninsula); BOOBERG in Handel. 7e Ned. Ind. Natuurw. Congres (1936) p. 403 (Java, Bali); VAN STEENIS in Trop. Nat. XXVI (1937) p. 70 (Bali); id. in Trop. Nat. XXVI (1937) p. 156 (S. Celebes); id. in Trop. Nat. XXVII (1938) p. 142 (S. Celebes).

RACHMAT); tali watata inlawanan (Celebes, TEYSMANN); manaring-pante (Celebes, Manado, Tomboeloe language, KOORDERS); andaliaran'a (Talaud Islands, LAM); baro baro, katang katang (Ceram, KORNASSI); bombarie (Banda); wimgamiere (Netherlands New Guinea, KOCH); urur (Territ. of New Guinea, SCHUMANN & HOLLRUNG); arodaidái, katang-katang, lagairái (Philippines, Tagálog and Bíkol languages, MERRILL); kamigang, bagasúa' (Philippines, Tagálog and Bisáya languages, MERRILL); daripai (Philippines, Tagálog, Bíkol and Bisáya languages, MERRILL); balim-balim, kabai-kabái, kamokamotíhan, tagarai (Philippines, Tagálog language, MERRILL); palang-palang, polang-polang (Philippines, Panay Bisáya language, MERRILL); lagilai (Philippines, Bagóbo language, MERRILL); lambaiong (Philippines, Súlu and Ilóko languages, MERRILL); daloidói (Philippines, Bíkol language, MERRILL); kamkamóte (Philippines, Ilóko language, MERRILL); vadinó (Philippines, Ivatán language, MERRILL). Also see DE CLERCQ—PULLE, Nieuw Plantk. Woordenb. ed. 2 (1927) p. 126.

Use: See WATT and HEYNE, l.l. c.c. According to VAN STRAELEN the sap of the stems is used in the island of Noesa Kambangan as a medicine against bites and stings of fishes.

ssp. **Pes-caprae** (L.) VAN OOSTSTR., nov. ssp. — *Convolvulus Pes caprae* L., Spec. Pl. ed. 1 (1753) p. 159; ROXB., Fl. Ind., ed. CAREY, I (1832) p. 486 — *Ipomoea biloba* FORSK., Fl. Aegypt.-Arab. (1775) p. 44 — *I. Pes-caprae* (L.) SWEET var. *biloba* (FORSK.) HALL. f. in Ann. R. Istit. Bot. Roma VII (1898) p. 231; id. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675.

Differs from the preceding subspecies in the form of the leaves and the dimensions of calyx and corolla. The leaves are in the average smaller, deeply two-lobed, with rounded lobes; the leaf base is cuneate to attenuate into the petiole. The outer sepals are c. 9 mm long, the inner ones c. 13 mm long; the corolla is 6.5 cm long.

SUMATRA, Tapanoeli, Batoe Islands, T. Batoe, RAAP 694, Febr. 1897 (B); Lampong Districts, Krakatau, Zwarte Hoek, BACKER 32327, June 1908 (B).

Distribution: East Africa (Somaliland), Continental Tropical Asia, Malay Archipelago.

Habitat: Sandy beaches.

Remarks. The ssp. *Pes-caprae* is based on *Convolvulus Pes caprae* L., characterized by LINNAEUS in the first edition of the Species Plantarum with the words:

CONVOLVULUS foliis bilobis, pedunculis unifloris.

Convolvulus foliis bilobis. *Fl. Zeyl.* 75.

Convolvulus foliis subrotundis apice emarginatis basi integris. *Roy. lugdb.* 428.

Convolvulus maritimus zeylanicus, folio crasso cordiformi. *Herm. lugdb.* 174. *t.* 175.

Schovanna-adamboe. *Rheed. mal.* 11. *p.* 117. *t.* 57.

Habitat in India.

The base of ssp. *brasiliensis* is *Convolvulus brasiliensis* L. described in the first edition of the Species Plantarum immediately after *C. Pes caprae* L.:

CONVOLVULUS foliis emarginatis, pedunculis trifloris.

Convolvulus marinus catharticus, folio rotundo, flore purpureo. *Plum. amer.* 89. *t.* 104.

Convolvulus marinus s. Soldanella brasiliensis. *Marcgr. bras.* 51. *Pis. bras.* 258.

Habitat in Brasiliae, Domingo *maritimis.*

Short as the descriptions given by Linnaeus are, there is no doubt, that Linnaeus used the name *C. Pes caprae* for specimens with deeply 2-lobed leaf blades, whereas the name *C. brasiliensis* was used on the contrary for specimens with emarginate leaf blades. A comparison of the plate of Rheede and that of Plumier can only confirm this opinion.

20. Ipomoea asarifolia (Desr.) R. & Sch., Syst. IV (1819) p. 251; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 145; Koorders, Exk. fl. Java III (1912) p. 121 — *Convolvulus asarifolius* Desr. in Lamk., Encycl. III (1789) p. 562 — *Ipomoea repens* Lamk., Tabl. Encycl. I (1791) p. 467, non Roth; Trimen, Handb. Fl. Ceyl. III (1895) p. 222; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 172; Gamble, Fl. Pres. Madras V (1923) p. 916 — *Convolvulus rugosus* Rottl. in Ges. Naturf. Fr. Neue Schr. IV (1803) p. 196 — *Ipomoea Beladamboe* R. & Sch., Syst. IV (1819) p. 233; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 209; Gagnep. & Courch. in Lec., Fl. Indo-Chine IV (1915) p. 260 — *Convolvulus Beladambu* (R. & Sch.) Spreng., Syst. I (1825) p. 608 — *Ipomoea rugosa* (Rottl.) Choisy in Mém. Soc. Phys. Genève VI (1833) p. 446; id. in DC., Prodr. IX (1845) p. 350; Wight, Icon. III, t. 887; Miq., Fl. Ned. Ind. II (1857) p. 602 — *I. urbica* (Salzm.) Choisy in DC., Prodr. IX (1845) p. 349 — *Convolvulus urbicus* Salzm. ex Choisy in DC., Prodr. l. c., pro syn.

A perennial prostrate or sometimes twining herbaceous plant, much resembling *I. Pes-caprae.* Stems thick, terete or angular, striate in dry specimens. Leaves petiolate; petiole rather thick, with a deep longitudinal groove above, smooth or minutely muricated, 3—9 cm long; blade orbicular to kidney-shaped, broadly rounded at the apex, not or slightly emarginate, minutely mucronate, cordate at the base with very wide to narrow sinus, the auricles rounded; length of blade 3.5—8 cm, width 3.5—10 cm. Inflorescences axillary, together with an axillary leafy shoot (or only 2 leafy shoots from a leaf-axil); peduncle angular, shorter or slightly longer than the petiole, 2—5.5(—10) cm, cymosely 1- or few-flowered; at least the central flower of the cyme with a pedicel much longer than the calyx, 14—24 mm long; sepals unequal, the outer ones shorter, all elliptic-oblong, obtuse, mucronulate, the outer ones 3-nerved, more or less muricated, 5—6 mm long, inner ones 8—9 mm; corolla red-purple, funnel-shaped, c. 5 cm long, glabrous; stamens and style included; stamens inserted c. 4 mm above the base of the corolla; filaments unequal, filiform, glabrous, except the shortly pilose dilated base; anthers lanceolate, c. 4 mm long (in open flower); ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; capsule globose, glabrous, c. 15 mm in diam.; seeds glabrous, as large as a pea (BAKER & RENDLE).

JAVA, Besoeki, Bondowoso, ZOLLINGER 2933, June 1845 (B, originally mixed with *I. Pes-caprae*).

BALI, Moengoeran, SARIP 22 (exped. MAIER), July 1918 (B, L).

Distribution: Tropical America, Cape Verde Islands, tropical Africa, tropical Asia.

Habitat: In marshy grasslands; between 1 and 250 m.

Vernacular name: kangkong (Bali, SARIP).

21. Ipomoea stolonifera (CYRILL.) GMEL., Syst. Veget. I (1796) p. 345; POIR. in LAMK., Encycl. VI (1804) p. 20; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 171; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 368 (*I. stolonifera* (CYRILL.) POIR.) — *Convolvulus littoralis* L., Syst. ed. 10 (1759) p. 924 — *C. stoloniferus* CYRILL., Pl. Rar. Neap. I (1788) p. 14 — *C. acetosaefolius* VAHL, Eclog. Am. I (1796) p. 18 — *Ipomoea carnosa* R. BR., Prodr. Fl. Nov. Holl. (1810) p. 485; BENTH., Fl. Austr. IV (1869) p. 420; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 213; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1061; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 238; RIDLEY, Fl. Malay Penins. II (1923) p. 461 — *I. acetosaefolia* (VAHL) R. & SCH., Syst. IV (1819) p. 246 — *Batatas littoralis* (L.) CHOISY in Mém. Soc. Phys. Genève VIII (1838) p. 46; id. in DC., Prodr. IX (1845) p. 337 — *B. acetosaefolia* (VAHL) CHOISY in Mém. Soc. Phys. Genève VIII (1838) p. 46; id. in DC., Prodr. IX (1845) p. 338 — *Ipomoea littoralis* (L.) BOISS., Fl. Orient. IV (1879) p. 112; non BLUME, 1825; HALL. f. in

ENGL., Bot. Jahrb. XVIII (1893) p. 144; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 316; KOORDERS, Exk. fl. Java III (1912) p. 119; BACKER in Trop. Nat. VII (1918) p. 55, fig. 9.

A glabrous perennial; stems to 5 m long (BACKER), trailing, rooting at the nodes, terete, wrinkled, glabrous. Leaves petiolate; petiole 0.5—4 cm long; blade fleshy, very variable in form, often of various forms on the same plant, linear, lanceolate, ovate or oblong with entire or undulate margin, obtuse or emarginate or 2-lobed at the apex, obtuse, truncate or cordate at the base, or the blade is three- to five-lobed with a lanceolate to ovate or oblong, large middle-lobe and smaller lateral lobes; blade 1.5—4(—6) cm long, 1—3(—5) cm broad. Inflorescences axillary, peduncled; peduncle short, 12—15 mm long, cymosely 1- or occasionally 2—3-flowered; pedicels 8—15 mm, in fruit up to 25 mm long; bracts minute, linear, 2—3 mm long; sepals subcoriaceous, glabrous, pale green, unequal, the exterior ones shorter, all oblong, acutish to obtuse, the top attenuate into a distinct mucro, the inner ones 10—15 mm long; corolla funnel-shaped, glabrous, white, pale yellow inside and with a purple centre, 3.5—5 cm long; stamens and style included; stamens inserted 4—5 mm above the corolla base; filaments filiform, unequal, hairy at the dilated base; anthers linear-oblong, sagittate, c. 4 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk annular; capsule globular, smooth, c. 1 cm high, 4-valved, 2-celled, 4- or less-seeded; seeds c. 8 mm long, short-tomentose and with longer hairs along the edges.

MALAY PENINSULA, sea sands, not common (RIDLEY); Pahang, Pulau Tiuman, Joara Bay, BURKILL, Singapore Field n. 978 (B); Malacca (PRAIN, RIDLEY).

JAVA, Madoera, W. of Ketapangdaja, BACKER 19994, March 1915 (B, L); Amboenten, JESWIET 1054, Aug. 1925 (W); id., BACKER 36469, March 1928 (Pa); W. and E. of Amboenten, BACKER 21210, July 1916 (B).

PHILIPPINE ISLANDS, Luzon, Cagayan (MERRILL, 1923); Babuyan Islands, Camiguin (MERRILL, 1923).

Distribution: Tropical and subtropical countries of both hemispheres.

Habitat: Sandy sea-shores, dunes; between 0 and 5 m.

22. Ipomoea violacea L., Spec. Plant. ed. 1 (1753) p. 161 — *I. tricolor* CAV., Icon. III (1794) p. 5, t. 208; CHOISY in DC., Prodr. IX (1845) p. 359; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 117 — *Convolvulus violaceus* (L.) SPRENG., Syst. I (1825) p. 599 — *Ipomoea rubro-caerulea* HOOK., Bot. Mag. (1834) t. 3297; CHOISY in DC., Prodr. IX (1845) p. 375 —

Pharbitis violacea (L.) Boj., Hort. Maurit. (1837) p. 227; Choisy in DC., Prodr. IX (1845) p. 344 — *Convolvulus rubro-caeruleus* (Hook.) Dietr., Syn. Pl. I (1839) p. 670 — *Pharbitis rubro-caerulea* (Hook.) Planch., in Fl. des Serres IX (1854) p. 281, t. 966.

A herbaceous glabrous twiner. Stems terete; leaves petiolate; petiole thin, 1.5—6 cm long; blade ovate, long-acuminate at the apex with acute, mucronulate acumen, cordate at the base, 3.5—7 cm long and 2.5—6 cm broad. Inflorescences axillary; peduncles as thick as the stems, fistulose, terete, 3—9 cm long, cymosely branched at the top; pedicels long, much longer than the calyces, 15—18, afterwards to 25 mm; bracts minute, triangular; sepals subequal, green with white margin, carinate along the midrib, narrow-triangular to ovate-lanceolate, gradually narrowed towards the top, 4.5—6 mm long; corolla violet-blue or purple, with a white tube, funnel-shaped, glabrous, 4—6 cm long; stamens and style included; stamens inserted 4—5 mm above the base of the corolla; filaments filiform, slightly dilated at the base, glabrous, very unequal; anthers linear, sagittate, in open flower c. 3 mm long; ovary glabrous; style filiform, glabrous, articulate close to the base; stigma biglobular, papillose. Capsule pale straw-coloured, ovoid, c. 8—10 mm long, mucronate by the base of the style, opening by 4 valves, 2-celled, 4-seeded; dissepiment persistent; seeds minutely puberulent, nearly 5 mm long, black.

Timor, North Middle Timor, Maobessi (Insana), locally frequent, c. 400 m, Mrs. Walsh 399, June 1929 (B).

Distribution: Mexico, Central America, West Indies, tropical South America; elsewhere cultivated and perhaps occasionally escaped from culture.

Habitat: Unknown.

Vernacular name: non loeli (Timor, Mrs. Walsh).

23. Ipomoea cairica (L.) Sweet, Hort. Brit. (1827) p. 287; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 148; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512; Koorders, Exk. fl. Java III (1912) p. 118; Gamble, Fl. Pres. Madras V (1923) p. 918, excl. syn. *I. pulchella* Roth; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 364; Degener & van Ooststr. in Degener, Fl. Hawaiiensis (1938) — *Convolvulus cairicus* L., Syst. ed. 10 (1759) p. 922 — *Ipomoea palmata* Forsk., Fl. Aegypt.-Arab. (1775) p. 43; Choisy in DC., Prodr. IX (1845) p. 386; Benth., Fl. Austr. IV (1869) p. 415; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 214; Warb. in Engl., Bot. Jahrb. XIII (1891) p. 413; Trimen, Handb. Fl. Ceyl. III

(1895) p. 225; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1057; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 178 — *Convolvulus tuberculatus* DESR. in LAMK., Encycl. III (1789) p. 545 — *Ipomoea stipulacea* JACQ., Hort. Schoenbr. II (1797) p. 39, t. 199 — *I. tuberculata* (DESR.) R. & SCH., Syst. IV (1819) p. 208; MIQ., Fl. Ned. Ind. II (1857) p. 619; HILLEBR., Fl. Hawaiian Isl. (1888) p. 315 — *Convolvulus paniculatus* NAVES in BLANCO, Fl. Filip. ed. 3 (1877—83) t. 32, non BLANCO (according to MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 364).

A glabrous twiner (or occasionally prostrate) with a tuberous root. Stems more or less tuberculate or smooth, yellowish. Leaves petiolate; petiole 2—6 cm long; blade ovate to orbicular in outline, thin, palmately cut to the base into 5 lanceolate or ovate-lanceolate to ovate or elliptic basally and apically acuminate entire segments with acute or obtusish mucronulate top, the basal pair of segments usually again lobed or parted; length and width of leaves 3—10 cm; petiole often with pseudostipules (small leaves of the axillary shoot) at its base. Inflorescences axillary, pedunculate, cymosely 1—few-flowered, the peduncle 0.5—7 cm; pedicels 12—20 mm long; bracts minute; sepals subequal or the exterior ones slightly shorter, 4—6.5 mm long, often minutely tuberculate without, thick, green, with pellucid dots and with pale, scarious margin, the exterior ones ovate, obtuse to acutish, mucronulate, the interior ones broader, obtuse, mucronulate; corolla funnel-shaped, with the tube contracted near the base at the place of insertion of the filaments, 4.5—6 cm long, white with purplish-red tinge on both surfaces and purplish-red towards the base only on the inner surface, occasionally entirely white (var. *flore albo* HALL. f. ¹)); stamens and style included; stamens inserted about 5 mm above the corolla base; filaments filiform, unequal, hairy at the dilated base; anthers linear-oblong, sagittate, c. 5—7 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk annular; capsule smooth, subglobose, 10—12 mm high, 4-valved, 2-celled, 4- or less-seeded; seeds c. 5—6 mm long, densely short-tomentose and with long (to 9 mm), silky hairs along the edges.

MALAY PENINSULA. Cultivated in every town, not wild anywhere (RIDLEY). Selangor, Port Swettenham, BURKILL, Singapore Field n. 1283, Aug. 1917 (B); Singapore, Botanic Garden, NUR s. n., June 1929 (B). Also in Malacca (PRAIN, as *I. pulchella* ROTH, see remarks).

JAVA, Batavia, Moeara baroe, SCHEFFER s. n., Aug. 1871 (B); Weltevreden,

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¹) HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; based on specimens cultivated in the Botanic Garden at Buitenzorg under n. XV. H. 25 and 25A.

Tanah abang, BACKER 32317, 32318, June 1902 and Jan. 1903 (B); Buitenzorg, Buitenzorg, cult. in a hedge, HALLIER 215a and b, Apr.—May and March 1893 (B); Priangan, Sindanglaja, cult., KOORDERS 42179 β, 42676 β, Aug. 1913 (B).

MOLUCCAS, Ceram laoet (WARBURG, 1891).

PHILIPPINE ISLANDS; widely distributed in cultivation, occurring also in waste places and thickets near dwellings (MERRILL). Luzon, Rizal prov., Manila, MERRILL 47, May 1902 (B); id., id., MERRILL, Bur. of Sc. 1432, Sept. 1911 (B, L); prov. of Laguna, MABESA, For. Bur. 26754, Febr.—Apr. 1917 (B); id., Los Baños, Mt. Maquiling, ELMER 18168, June—July 1917 (B, L, U).

Distribution: Of wide distribution in tropical Asia and Africa, naturalized elsewhere.

Habitat: Cultivated; wild in waste places, thickets etc.

Vernacular names: railway creeper (Malay Peninsula, PRAIN); tatampajan (Java, Batavia, SCHEFFER); aurora (Spanish, Philippines, MERRILL).

Remarks. Several authors [1]) have wrongly mentioned this species under the name of *I. pulchella* ROTH. The true *I. pulchella* is a species with a much smaller, c. 1.5 cm long, corolla, differing, moreover, in several other characteristics.

24. Ipomoea coptica (L.) ROTH apud R. & SCH., Syst. Veg. IV (1819) p. 208; ROTH, Nov. Pl. Spec. (1821) p. 110; CHOISY in DC., Prodr. IX (1845) p. 384; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 147; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; HALL. f. in ENGL., Bot. Jahrb. XXVIII (1899) p. 45 — *Convolvulus copticus* L., Mant. II, App. (1771) p. 559 — *Ipomoea dissecta* WILLD., Phytogr. (1794) p. 5, t. 2; MIQ., Fl. Ned. Ind. II (1857) p. 608; BENTH., Fl. Austr. IV (1869) p. 416; SCHEFFER in Ann. Jard. Bot. Buit. I (1876) p. 39; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 200; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 104; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 213; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1058; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 176; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 115.

Annual, glabrous. Stems herbaceous, slender, trailing or sometimes twining. Leaves petiolate; petiole mostly shorter than the blade, 3—8 (—20) mm long, with pseudostipules (small leaves of the axillary shoot) at the base; blade digitate, orbicular in outline, 1—3 cm long and broad, with 5 coarsely dentate to deeply and irregularly, once or sometimes twice

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[1]) In literature relative to tropical Asia: WIGHT, Icon. I (1840) t. 158; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 312; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 117; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 257; RIDLEY, Fl. Malay Penins. II (1923) p. 460.

pinnatifid segments, the teeth or lobes of the segments mostly acute; the middle segment larger than the lateral ones, ovate, oblong, lanceolate or oblanceolate in outline, the two basal segments sometimes 2-lobed again. Peduncles axillary, narrowly 2-alate, mostly shorter than the leaves, 1—3.5 cm long, cymosely 1—3-flowered; bracts lanceolate, entire (var. *genuina* HALL. f.[1]), very acute, small, 1.5—3 mm, or sometimes larger and palmately laciniate like the leaves (var. *acuta* CHOISY[2]); pedicels 4—5 (—7) mm long, at first erect, afterwards in fruit bent downwards; sepals thinly coriaceous, subequal, oblong or elliptic, minutely cuspidate, verruculose on the back, c. 4 mm long; corolla small, white, funnel-shaped, c. 12 mm long; capsule globose, c. 7—8 mm in diam., glabrous, 3-celled, 6-seeded; seeds c. 2.5 mm long, densely greyish-tomentose.

MALAY PENINSULA, Penang (according to MIQUEL, l. c.).

NEW GUINEA, Netherlands New Guinea, near Doré (according to SCHEFFER, l. c.; collected there by TEYSMANN).

Distribution: Tropical and South Africa, tropical Asia, North Australia.

Habitat: Unknown.

25. **Ipomoea diversifolia** R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 487; BENTH., Fl. Austr. IV (1869) p. 416; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1057; MERRILL in Philipp. Journ. Sc. XIII (1918) p. 57; id., Enum. Philipp. Fl. Pl. III (1923) p. 365 — *Convolvulus diversifolius* (R. BR.) SPRENG., Syst. I (1825) p. 592 — *Pharbitis laciniata* DALZ. in HOOK., Kew Journ. of Bot. III (1851) p. 178 — *Ipomoea laciniata* (DALZ.) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 200.

Annual, glabrous. Stems herbaceous, slender, trailing or twining. Leaves petiolate; petiole mostly shorter than the blade, 3—12 mm long, with pseudostipules (small leaves of the axillary shoot) at the base; blade digitate, orbicular in outline, 1—2.5(—5) cm long and broad, with 5 coarsely and irregularly dentate to pinnatifid segments, the two basal of which sometimes bifid, the middle segment larger than the lateral ones, all narrow-oblong to oblanceolate in outline; peduncles axillary, angular or flattened, shorter than the leaves, 7—20 mm long, mostly 1-, sometimes to 3-flowered; bracts lanceolate, very acute, small, c. 3 mm; pedicels erect, 8—12, in fruit to 15 mm, at least in fruit thickened towards the calyx and erect; sepals elliptic or narrow-elliptic or oblong-lanceolate, cuspidate or acute, subequal or the inner ones slightly longer, 6—10 mm long, the back carinate and muricated; corolla white, purple inside at the tube, nearly 5 cm long, funnel-shaped, with long tube; capsule subglobose, glabrous; seeds densely tomentose.

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[1] HALL. f. in ENGL., Bot. Jahrb. XXVIII (1899) p. 45.

[2] CHOISY in DC., Prodr. IX (1845) p. 384; HALL. f. in ENGL., Bot. Jahrb. XXVIII (1899) p. 47.

PHILIPPINE ISLANDS, Luzon, prov. Ilocos Norte, Bangui, (according to MERRILL, 1918, 1923; I did not see the specimens mentioned by MERRILL).

Distribution: British India, Philippines, Northeastern Australia.

Habitat: In grasslands at low altitudes.

Remarks. *I. diversifolia* R. BR. is only known to me from the descriptions by ROBERT BROWN, BENTHAM and MANSON BAILEY. According to some identifications in the Rijksherbarium at Leiden, by HALLIER, *I. laciniata* (DALZ.) CLARKE [1]) from British India is identic. MERRILL based his identification of the Philippine plants only on the descriptions mentioned.

26. Ipomoea graminea R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 485; BENTH., Fl. Austr. IV (1869) p. 421; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1062 — *Convolvulus gramineus* (R. BR.) SPRENG., Syst. I (1825) p. 607.

This species is unknown to me. ROBERT BROWN collected it on the islands off Cape Wilberforce (North Australia), and BENTHAM (Fl. Austr. IV (1869) p. 421) only knew it from that locality. According to VON MUELLER's Census it is also known from Queensland. The original description of ROBERT BROWN l. c. reads:

"*I. graminea*, glabra, foliis elongato-linearibus mucronatis integerrimis, pedunculis unifloris, calycibus obtusis, corollis longissimis (T.) *v.v.*"

BENTHAM describes the species as follows:

"A slender, glabrous twiner. Leaves on short petioles, linear-lanceolate or linear, entire, 4 to 8 in. long. Peduncles 1-flowered, ½ to 1½ in. long (including the pedicel), with very small distant bracts. Sepals oblong, obtuse, ½ in. long or rather more, the outermost one shorter. Corolla 2½ to 3 in. long, contracted into a slender tube."

There are two specimens from Papua in the Rijksherbarium at Leiden, both in fruiting state, which fairly well agree with these descriptions:

NEW GUINEA, Papua, Aroa River, CARR 11461, Febr. 1935 (L); Mabaduan, W. Division, not common, BRASS 6565, Apr. 1936 (L).

Distribution: N. Australia, Queensland, New Guinea.

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[1]) These specimens of *I. laciniata* (DALZ.) CLARKE, from British India, I used for the description.

Habitat: Amongst grasses in open savannah-land and savannah-forests; at low altitudes.

Remarks. CARR mentions that the flowers are white and that they open in the evening; BRASS calls them dirty white and supposes they are nocturnal blooming.

Subsection 2. *Calonyction* (CHOISY) HALL. f.

HALL. f. in Meded. Rijksherb. Leiden 46 (1922) p. 19 — genus *Calonyction* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 441 — *Ipomoea* section *Calonyction* (CHOISY) GRISEB., Fl. Brit. West Indian Isl. (1864) p. 466, p.p. — *Ipomoea* subgenus *Calonyction* (CHOISY) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 197.

Annual (or perennial ¹)) herbaceous twiners, glabrous or sometimes pubescent or hirsute; stems often muricated; leaves cordate, sometimes angular, herbaceous. Flowers nocturnal, axillary, solitary or often in a cincinnus or in a dichasial cyme; sepals herbaceous to membranaceous, glabrous or sometimes hirsute, long-aristate or rarely blunt, subequal or the exterior ones smaller; corolla large, actinomorphic or slightly zygomorphic, white, pink or lilac, glabrous, salver-shaped, the tube very long, narrow-cylindrical or rarely widened above the middle; stamens and styles often exserted; ovary glabrous, 2-celled or rarely 4-celled, 4-ovuled; stigma biglobular; capsule 4-valved, 4-seeded; seeds large, glabrous, opaque.

27. Ipomoea alba L., Spec. Pl. ed. 1 (1753) p. 161; HALL. f. in Meded. Rijksherb. Leiden 1 (1911) p. 25; id., in Meded. Rijksherb. Leiden 46 (1922) p. 19 — *Convolvulus aculeatus* L., Spec. Pl. ed. 1 (1753) p. 155 — *Ipomoea bona-nox* L., Spec. Pl. ed. 2 (1762) p. 228; CURTIS, Bot. Magaz. XIX (1804) t. 752; BL., Bijdr. (1825) p. 712; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 197; FORBES, Wander., Germ. ed. II (1886) p. 222; HILLEBR., Fl. Hawaiian Isl. (1888) p. 314; SCHUM. & HOLLR., Fl. Kais. Wilh. Land (1889) p. 115; WATT, Dict. Econ. Prod. India IV (1890) p. 483; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 101; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 213; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1061 — *Convolvulus bona-nox* (L.) SPRENG., Syst. I (1825) p. 600 — *Calonyction speciosum* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 441, t. 1, fig. 4, excl. var. b; DECAISNE, Herb. Timor. (1835) p. 62; SPANOGHE in Linnaea XV (1841) p. 338;

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¹) See HALLIER in Bull. Herb. Boiss. V (1897) p. 1038—1039.

CHOISY in DC., Prodr. IX (1845) p. 345, excl. var. γ ex p. et var. δ (cf. HALL. f. in Bull. Herb. Boiss. V, p. 1030); ZOLL., Syst. Verz. 2. Heft (1854) p. 128; MIQ., Fl. Ned. Ind. II (1857) p. 596, excl. var. γ et δ (cf. HALL. f. in Bull. Herb. Boiss. V, p. 1030); id., Suppl. (1860) p. 235; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 153; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 285 — *C. bona-nox* (L.) BOJ., Hort. Maur. (1837) p. 227; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 379, 1028; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 515; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 319; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 118; KOORDERS, Exk. fl. Java III (1912) p. 122; GAMBLE, Fl. Pres. Madras V (1923) p. 920; RIDLEY, Fl. Malay Penins. II (1923) p. 463; HEYNE, Nutt. Pl., ed. 2 (1927) p. 1306 — *Convolvulus muricatus* BLANCO, Fl. Fil. ed. 1 (1837) p. 92; id., ed. 3, I (1877) p. 127, Ic. II, t. 332, non L.; MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 62; id., Spec. Blanc. (1918) p. 321 — *Calonyction speciosum* CHOISY var. *muricatum* auct.; HASSK., Pl. Jav. Rar. (1848) p. 522, excl. syn. *I. aculeata* BL. — *C. aculeatum* (L.) HOUSE in Bull. Torr. Bot. Club 31 (1904) p. 590; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 369; OCHSE & BAKHUIZEN VAN DEN BRINK, Indische Groenten (1931) p. 153, fig. 94; (see also HALL. f. in Meded. Rijksherb. Leiden 1 (1911) p. 25, n. 77). For a more detailed list of the synonyms see HALL. f. in Bull. Herb. Bois. V (1897) p. 1028, sub *Calonyction bona-nox* (L.) BOJ.

A glabrous or rarely pubescent (see remarks) twiner, to 5 m high. Stems herbaceous, annual[1]), to 3—4 mm thick, with a white milky juice, slender, terete, smooth or sometimes muricated. Leaves petiolate; petiole long and slender, 5—20 cm; blade thin, ovate or orbicular in outline, rarely oblong to ovate-oblong, the margin entire, or 3-lobed, often on the same plant; the apex acuminate with acute or obtuse, mucronulate acumen, the base cordate with broad or narrow, rounded sinus and with broadly rounded or sometimes angular auricles; length of blade 6—20 cm, width 5—16 cm; lateral nerves c. 7—8 on each side of the midrib. Inflorescences axillary, 1—several-flowered, the flowers in a cincinnus, rarely dichasial; peduncle stout, terete, 1—24 cm long; pedicels 7—15 mm long, much thickened and clavate in fruit and then to 25 or 30 mm long; bracts small, deciduous; flowers opening at night[2]), fragrant; sepals coriaceous, elliptic, glabrous, unequal, the 2 or 3 exterior ones shorter and with a long, thick recurved or patent awn, the interior ones longer, mucronulate with a much shorter and thinner mucro; exterior sepals 5—10 mm long, awn 4—8 mm; interior sepals 8—15 mm long, mucro 2—3 mm; sepals often reflexed in fruit; corolla white with greenish bands, hypocrateriform, the cylindrical tube 7—12 cm long, suddenly expanding into the 11—14 cm broad rotate limb; stamens and style exserted; stamens inserted in the upper part of the corolla tube; filaments filiform, glabrous, white; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; capsule ovoid, mucronate by the persistent base of the style, 2.5—3 cm high, 4-valved with oblong valves, 2-celled, 4-seeded; seeds glabrous, smooth, brown or black, 10—12 mm long, 7—8 mm broad.

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[1]) See HALLIER in Bull. Herb. Boiss. V (1897) p. 1038—1039.

[2]) See HALLIER in Bull. Herb. Boiss. V (1897) p. 1042—1044; id. in Meded. Rijksherb. Leiden 46 (1922) p. 19, note.

Malay Peninsula. Often cultivated in gardens, but does not establish itself outside (Ridley). According to Prain cultivated in Penang and in Singapore.

Sumatra, without locality, Korthals 119 (L); West Coast, Padang, Korthals 235 (L); Pariaman, Diepenhorst 2123 HB (B); Fort de Kock, cult., Jacobson 2137, Dec. 1922 (B); Palembang, Komering-hoeloe, dry ricefields, cult., Grashoff 598, Aug. 1915 (B); Lampong Districts, between Kenali and Negarabatin, Cramer 120, Aug. 1915 (B).

Java, without locality, Korthals 242 (L); Waitz 183 (L); Blume 1562, Oct. (L); Batavia, G. Parang, Reinwardt 1234 (L); Tjidoerian near Tjikoja, Zollinger 445 (L); Buitenzorg, Buitenzorg, cult., Bakhuizen van den Brink 7879, May 1928 (B); Pabaton, van Steenis 1606, June 1928 (B); Kotaparis, cult., Bakhuizen van den Brink fil. 2447, March 1923 (B, L); cult. in the Botanic Garden, n. XV. K. B. IX. 1 (B); XV. K. B. XI. 4 (B); XV. K. B. XIII. 3 (B); Gedeh, N.W. slope above Buitenzorg, Backer 24006, Apr. 1918 (B); Soekaboemi, Boerlage s.n., July 1888 (L); Tjidadap, S. of Tjibeber, cult., Winckel 1156 β, June 1917 (B); Priangan, Tasikmalaja, Noesagede Island, lake of Pendjaloe, Koorders 47916 β, Aug. 1917 (B); Pekalongan, Tegal, Goedji, de Monchy s. n. (B); Madioen, Ngebel, G. Wilis, Koorders 23181 β, May 1896 (B); Malang, Tengger, Buysman s. n., Febr. 1908 (U); Besoeki, Idjen plateau between Sempol and G. Merapi, Backer 25261, June 1918 (B); Djember, Ultée 5 (B); Madoera, between Boernih and Kesek, Dorgelo 3111, July 1924 (Pa); Kangean Islands, Kangean, Paseraman, Backer 29962, May 1919 (B).

Celebes, without locality, Forsten 57 (L); Celebes and Dependencies, Tjampalagia, Rachmat 242 (exped. van Vuuren), July 1913 (B); Malino, Bünnemeyer 10717, Apr. 1921 (B); Lombasang, Bünnemeyer 11182, Apr. 1921 (B); Kalolo near Lombasang, Bünnemeyer 11551, May 1921 (B, L); Tanette, Bünnemeyer 11759, May 1921 (B); Manado, Tomohon, fertile volcanic sand, Koorders 16580 β, Jan. 1895, a pubescent specimen, see remarks (B).

Lombok, Rindjani, N. E. side, Sembaloen plateau, Elbert 1566, May 1910 (L).

Flores, Mborong, Mrs. Rensch 1454, July 1927 (BD, mixed with *Operculina Riedeliana* (Oliv.) van Ooststr.).

MOLUCCAS, Ceram, Manoesela, KORNASSI 575, Nov. 1917 (B); Middle Ceram, Walokone, RUTTEN 2206, May 1919 (B).

NEW GUINEA, Territory of New Guinea, Hatzfeldthafen, Finschhafen, Ramu R. (according to SCHUMANN & HOLLRUNG and to SCHUMANN & LAUTERBACH).

BISMARCK ARCHIPELAGO, New Britain, Gazelle Peninsula (according to SCHUMANN & LAUTERBACH).

PHILIPPINE ISLANDS. "This species is common and widely distributed in the settled areas of the Philippines at low and medium altitudes, is certainly an introduced plant in the Archipelago, and probably originated in tropical America" (MERRILL). Luzon, Cagayan prov., CURRAN, For. Bur. 16724, March 1909 (L); Prov. of Nueva Vizcaya, vicinity of Dupax, MCGREGOR, Bur. of Sc. 11151, March—Apr. 1912 (L); Rizal prov., RAMOS, Bur. of Sc. 10910, Oct. 1909 (B, L); id., Antipolo, RAMOS, Bur. of Sc. 445, Nov. 1910 (U); id., id., MERRILL, Spec. Blanc. 177, Nov. 1914 (B, L); Prov. of Laguna, Calauan, MCGREGOR, Bur. of Sc. 12381, Nov.—Dec. 1910 (L). According to MERRILL also in Masbate, Samar and Leyte.

Distribution: Circumtropical, originally in tropical America (see HALLIER in Meded. Rijksherb. Leiden 46 (1922) p. 19).

Habitat: Cultivated in gardens and wild in thickets, hedges, along waysides and edges of forests; between 1 and 1400 m.

Vernacular names: moonflower; bering roembi (Sumatra, West Coast, DIEPENHORST); troelak (Sumatra, Palembang, GRASHOFF); teroelak (Mal., HEYNE, OCHSE); terong kori boddas (Sund., Java, HASSKARL); soendal malam, areuj koetjoeboeng (Sund., Java, BAKHUIZEN VAN DEN BRINK, HEYNE, KOORDERS, OCHSE); koeroelak (BLUME); kloerak (Jav., Java, Madioen, KOORDERS); boenga pareh (Celebes, RACHMAT); pitoer (Celebes, Manado, Tomboeloe language, KOORDERS); kalakamóte, malakamóte, kamokamotíhan (Philippines, Tagálog and Bisáya language, MERRILL); kakaiuit (Philippines, Gaddáng language, MERRILL); pekpeket (Philippines, Bontók language, MERRILL).

Use: Often cultivated in gardens. According to HEYNE the young leaves are eaten as a vegetable (Palembang). The dried flowers (soendal malam, sĕdĕp malam) are used in pies and in kimlo (Chinese vegetable soup) (OCHSE, l. c. p. 154, 155). Also see WATT, l. c. p. 483, 484.

Remarks. HALLIER in Bull. Herb. Boiss. V (1897) p. 1037—1038 distinguishes two varieties, each subdivided into two subvarieties, on account of the form of the leaves and the absence or presence of a pubescence.

var. *normalis* HALL. f., l. c. p. 1037; leaves cordate, entire.
subvar. 1. *glabra* HALL. f., l. c. p. 1037; leaves glabrous.
subvar. 2. *pubescens* HALL. f., l. c. p. 1037; leaves with a dense

and soft pubescence on the nerves beneath, sepals glabrous or hairy at the base, stems glabrous or hairy at the nodes, petioles glabrous.

var. *lobata* Hall. f., l. c. p. 1037; leaves at least partly 3—5-lobed, mostly with large middle lobe and much smaller lateral lobes.

subvar. 1. *calva* Hall. f., l. c. p. 1037; leaves glabrous.

subvar. 2. *hirsuta* Hall. f., l. c. p. 1038; young parts pubescent (subsericeous), afterwards often glabrescent.

A subdivision on account of the form of the leaves appears to be of doubtful value, as the middle leaves of many specimens are 3- to 5-lobed, whereas the upper ones are entire (Hallier in Meded. Rijksherb. Leiden 46 (1922) p. 19—20).

By far the greater part of the specimens from Malaysia is glabrous; a distinctly pubescent specimen is Koorders 16580 β, from Manado, Celebes (mentioned by Koorders in Meded. 's Lands Plantent. XIX (1898) p. 542, as *Ipomoea alba* L. var. *pubescens* Choisy, a combination never made by Choisy; see Hall. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675).

28. **Ipomoea muricata** (L.) Jacq., Hort. Schoenbr. III (1798) p. 40, t. 323, non Cav., 1799; Miq., Fl. Ned. Ind. II (1857) p. 608, excl. syn. Bl. et Dietr.; Clarke in Hook., Fl. Brit. Ind. IV (1883) p. 197; Watt, Dict. Econ. Prod. India IV (1890) p. 487; Prain in Journ. As. Soc. Bengal LXIII (1894) p. 101 — *Convolvulus muricatus* L., Mant. (1767) p. 44 — *Ipomoea bona-nox* L. var. *purpurascens* Ker, Bot. Reg. IV (1818) t. 290 — *Calonyction muricatum* (L.) Don, Gen. Syst. IV (1838) p. 264; Hall. f. in Engl., Bot. Jahrb. XVIII (1893) p. 154; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 1044; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 118; Duthie, Fl. Upper Ganget. Pl. II (1911) p. 118; Koorders, Exk. fl. Java III (1912) p. 122; Gagnep. & Courch. in Lec., Fl. Indo-Chine IV (1915) p. 286; Gamble, Fl. Pres. Madras V (1923) p. 920; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 370 — *C. longiflorum* Hassk., Cat. Hort. Bog. (1844) p. 140; id., Pl. Jav. Rar. (1848) p. 523, excl. syn. — *C. speciosum* Choisy var. *muricatum* (L.) Choisy in DC., Prodr. IX (1845) p. 345, excl. synn. Willd., Ledeb., Bl., Dietr. — *Convolvulus colubrinus* Blanco, Fl. Fil. ed. 2 (1845) p. 66; id. ed. 3, I (1877) p. 125, Ic. II, t. 315 (according to Merrill in Bur. Gov. Lab. Philipp. 27 (1905) p. 63; id., Spec. Blanc. (1918) p. 321).

A glabrous or nearly glabrous twiner; all green parts containing a white milky juice; stems herbaceous, annual, terete or angular, muricated, warts small, acute; leaves petiolate; petiole 4—12 cm long, muricated or smooth; blade broadly ovate to orbicular, acuminate at the apex with acute or obtuse, mucronulate acumen, distinctly cordate at the base, with wide or narrow sinus and broadly rounded auricles, 7—18 cm long, 6.5—15 cm broad; nerves c. 5—6 on each side of the midrib. Inflorescences axillary; peduncles muricated, 1—few-flowered, 3—6 cm long; pedicels smooth, 10—20 mm long, or longer, thickened towards the calyx, very thick in fruiting stage; bracts oblong, acute, scarious, c. 8 mm long; sepals about equal in length, the two outer ones oblong to ovate, more or less plicate at the top and attenuate into a thick, suberect awn, the three inner ones obtuse or slightly emarginate, distinctly awned; length of outer sepals, without awn c. 6—7 mm, of inner sepals c. 7—8 mm, awn of outer sepals 4—6, of inner sepals c. 4 mm; corolla pale bluish-purple, opening at night [1]), glabrous, long-funnel- to salver-shaped, c. 5—7.5 cm long, with a narrow, cylindrical, c. 3—6 cm long tube, this tube widened above at the place of insertion of the filaments; limb funnel-shaped to rotate, 5-angular. Stamens and style not or scarcely exserted; stamens inserted in the upper part of the corolla tube; filaments filiform, glabrous, the base dilated, with sparse short hairs; anthers oblong, sagittate, in open flower c. 3 mm long; ovary glabrous; style glabrous, filiform; stigma biglobular, papillose; capsule ovoid, c. 18—20 mm high, enclosed at the base by the slightly enlarged, to 15 mm (with awn) long sepals, 4-valved, with thin papery valves, 2-celled, 4-seeded; seeds black, glabrous, c. 9—10 mm long.

JAVA; cultivated (according to KOORDERS).

PHILIPPINE ISLANDS, cultivated only (MERRILL). Luzon, Union prov., Bauang, cult., FENIX s. n., Apr. 1918 (B).

Distribution: America, from Mexico to Colombia and Brazil, the West Indies, tropical Africa and adjacent islands, British India, China, Japan, Philippines (cultivated).

Vernacular names: pipita de tonkin (Philippines, Luzon, FENIX); tonkín, tunkín (Philippines, Tagálog language, MERRILL).

Use: Cultivated for its flowers. In the Philippine Islands used as a remedy against snake-bites (BLANCO). See WATT, l. c.

Subsection 3. *Quamoclit* (MOENCH) HALL. f.

HALL. f. in Meded. Rijksherb. Leiden 46 (1922) p. 20 — genus *Quamoclit* MOENCH, Meth. (1794) p. 453 (*Quamoelit*) — *Ipomoea* section

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[1]) HALL. f. in Bull. Herb. Boiss. V (1897) p. 1048.

Quamoclit (MOENCH) GRISEB., Fl. Brit. West Indian Isl. (1864) p. 472 — *Ipomoea* subgenus *Quamoclit* (MOENCH) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 198.

Annual (or perennial, HOUSE) herbaceous twiners, mostly glabrous; leaves cordate, often angular or palmately 3—5-lobed, rarely deeply pinnately divided. Flowers mostly axillary, often in a dichasium consisting of two scorpioid cymes or in a real dichasium, rarely solitary; sepals herbaceous to membranaceous, small, glabrous, obtuse, mostly aristate below the apex, subequal or the exterior ones shorter; corolla small or medium-sized, often slightly zygomorphic, often bright red, rarely yellow or white, glabrous, salver-shaped, the tube cylindrical or thickened upwards, the limb patent; stamens and style exserted, usually declinate; ovary glabrous, 4-celled, 4-ovuled; stigma biglobular; capsule 4-valved, 4-celled, 4-seeded; seeds glabrous or rarely puberulent, opaque, black.

29. **Ipomoea angulata** LAMK., Tabl. Encycl. I (1791) p. 464 — *I. phoenicea* ROXB., Fl. Ind. ed. CAREY & WALL., II (1824) p. 92; id., Fl. Ind. ed. CAREY, I (1832) p. 502 — *Convolvulus angulatus* (LAMK.) SPRENG., Syst. I (1825) p. 594 — *C. phoeniceus* (ROXB.) SPRENG., Syst. I (1825) p. 596 — *Quamoclit phoenicea* (ROXB.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 433; id. in DC., Prodr. IX (1845) p. 336; MIQ., Fl. Ned. Ind. II (1857) p. 594; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 318; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 122; GAMBLE, Fl. Pres. Madras V (1923) p. 919; RIDLEY, Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 370 — *Q. angulata* (LAMK.) BOJ., Hort. Maurit. (1837) p. 224; CHOISY in DC., Prodr. IX (1845) p. 336; HALL. f. in Bull. Herb. Boiss. VII (1899) p. 415.

A herbaceous annual twiner. Stems terete or slightly angular, often contorted, 2—5 m high (BACKER), glabrous or sparsely pilose. Leaves petiolate; petiole slender, shorter or longer than the blade, 3—12 cm, glabrous or sparsely pilose; blade mostly glabrous, ovate or broad-ovate to orbicular in outline with acuminate, mucronulate apex and cordate base, the margin entire, angular, coarsely dentate or obscurely to deeply 3-lobed, in the latter case the middle lobe lanceolate to elliptic-lanceolate or ovate, acuminate and mucronulate at the apex, narrowed towards the base, the lateral lobes more or less oblique, lanceolate or ovate, entire or angular; length of the blade 3—15 cm, width 3—10 cm. Inflorescences lateral or terminal, 10—35 cm long, few- to several-flowered, pedunculate; peduncle often longer than the petiole, 3—20 cm long, terete or angular, glabrous or pubescent, cymosely branched at the top, the first ramification mostly dichasial with terminal flower, the sequent ones monochasial; flowers and fruits on erect pedicels; pedicels angular, 5—7 mm long, sometimes longer, in fruit up to 8—12 mm, those of the central flower up to 15 mm long; bracts minute, 1.5—2 mm long, triangular, mucronulate; sepals oblong-rectangular with broadly obtuse or truncate apex and with a large straight or slightly curved awn inserted immediately below the top; length of the outer sepals without awn 2—2.5, of the inner ones 3 mm; awn 3—4 mm; corolla scarlet, glabrous, hypocrateriform, 3.5—4 cm long, the tube narrowed towards the base, slightly curved, the patent limb up to 2 or 2.5 cm in diam.; stamens and style exserted; filaments slightly unequal, inserted c. 9 mm above the corolla base, filiform, glabrous; anthers elliptic, c. 1.5 mm long (in open flower); ovary glabrous, at base enclosed by a cup-shaped, c. ¾ mm high disk; style filiform, glabrous; stigma globular, papillose; capsules on erect pedicels, globular, 5—7 mm high, glabrous, 4-valved, 4-celled, the dissepiments persistent, pellucid, with a thickened circular margin; seeds 4, c. 4 mm long, black, densely pubescent; sepals in fruit patent, afterwards reflexed.

Malay Peninsula. Cultivated in gardens, but has not established itself outside (Ridley). Prain (1906) only mentions a specimen from Singapore.

Java. According to Backer of tropical American origin. Cultivated for several years for ornamental purposes; frequently run wild at low and medium altitudes, in thickets and grasslands, slopes of ravines, borders of cane fields, locally abundant. Bantam, Prinseneiland, Keulemans s. n. (L); Batavia, Pal Merah, Backer 35453, Sept. 1904 (B); Grogol (Pal Merah), cult. ?, Backer 35453, July 1904 (B); Buitenzorg, Buitenzorg, cult. in the Botanic Garden, Kuhl & van Hasselt 77 (B, L); id., Hallier D 212c, Aug. 1893 (L); Priangan, Bandoeng, van der Veen s. n., herb. v. O. 820, Sept. 1923 (L); id., along brooklet in ravine, totally covering the slopes, van Steenis 1665, May 1928 (B); Semarang, Kedoeng djati, Koorders 28174 β, June 1897 (B, L); Madioen, Doengoes, Wisse 358, Apr. 1920 (B); valley of Kali Tjatoer, Wisse 409, Apr. 1921 (B); Ngebel, near rest-house, Koorders 23236 β, May 1898 (B); Kediri, forest district N. Kediri, Toengloer, old teak-wood, on red volcanic soil, Grutterink 3281, June 1920 (B); forest district S. Kediri, Gadoengan, clearings in forest, Kramer 334, July 1923 (B); Paré, sugar cane plantation Kentjang, van Harreveld s. n., May 1914 (B); Malang, Bantoer, Backer 36677, July 1927 (Pa); Balesari near Gondang legi, Backer 3546, May 1912 (B); Tengger, Buysman s. n., Febr. 1908 (U); Besoeki, N. slope of G. Idjen, above Bajeman, Backer 24969, June 1918 (B); id., id., Backer 30802, April 1920 (B).

Timor, Beloe, Asoemanoe, Fialaran, Mrs. Walsh 422, June 1929 (B).

Bismarck Archipelago, New Ireland, Peekel 57 (B, L).

Philippine Islands; according to Merrill in thickets at low altitudes, thoroughly naturalized. Luzon, Rizal prov., Ramos, Bur. of Sc. 1953, Nov. 1914

(B, L); id., REILLO, Bur. of Sc. 19178, Dec. 1912 (L); id., Antipolo, MERRILL 89, Jan. 1910 (U).

Distribution: A native of tropical America, now circumtropical.

Habitat: Cultivated in gardens; run wild in waste places, fields, grasslands, thickets and thin forests; up to 1200 m.

Vernacular names: ajong ajong (Sund., Java, BLUME, MIQUEL); rajoetan, sanggolangit (Java, Kediri, VAN HARREVELD, KRAMER). Also see DE CLERCQ—PULLE, Nieuw Plantk. Woordenb. ed. 2 (1927) p. 188, under *Quamoclit coccinea* MOENCH.

Use: Often cultivated for ornamental purposes.

Remarks. Several authors [1]) have confounded this species with the North American *I. coccinea* L. (L., Spec. Pl. ed. 1 (1753) p. 160; *Quamoclit coccinea* (L.) MOENCH, Meth. (1794) p. 453). For a discussion of the differences between the two species see HALL. f. in Bull. Herb. Boiss. VII (1899) p. 415. Of the true *I. coccinea* L. I saw a specimen cultivated in the Botanic Garden at Buitenzorg (n. XV. K. B. X. 4).

30. Ipomoea Quamoclit L., Spec. Pl. ed. 1 (1753) p. 159; CURTIS, Bot. Mag. VII (1794) t. 244; BL., Bijdr. (1825) p. 708; ROXB., Fl. Ind. ed. CAREY, I (1832) p. 503 (*I. Quamoclit* WILLD.); SPANOGHE in Linnaea XV (1841) p. 339; BENTH., Fl. Austr. IV (1869) p. 428; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 199; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; WATT, Dict. Econ. Prod. India IV (1890) p. 491; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 215; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1067; MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 62; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 235; MERRILL, Spec. Blanc. (1918) p. 322 — *Convolvulus pennatus* DESR. in LAMK., Encycl. Meth. III (1789) p. 567 — *C. Quamoclit* (L.) SPRENG., Syst. I (1825) p. 591 — *Quamoclit vulgaris* CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 434; id. in DC., Prodr. IX (1845) p. 336; ZOLL., Syst. Verz. 2. Heft (1854) p. 128; MIQ., Fl. Ned. Ind. II (1857) p. 594; id., Suppl.

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[1]) Mentioned as *I. coccinea* L. by CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 199; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 215; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1067; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 236.

Mentioned as *Quamoclit coccinea* (L.) MOENCH by MIQ., Fl. Ned. Ind. II (1857) p. 593; id., Fl. Ned. Ind., Suppl. (1860) p. 234; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 154; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 131; id. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 513; KOORDERS, Exk. fl. Java III (1912) p. 123; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 530.

(1860) p. 234; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 515; MERRILL in Philipp. Journ. Sc. I, Suppl. (1906) p. 119 — *Q. pinnata* BOJ., Hort. Maurit. (1837) p. 224; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 154; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 131[1]); id. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 513; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 318; DUTHIE, Fl. Upper Ganget. Pl. II (1911) p. 122; KOORDERS, Exk. fl. Java III (1912) p. 123; RENDLE in Journ. Linn. Soc. XLII (1914) p. 113; MERRILL, Interpr. Rumph. Herb. Amb. (1917) p. 446; id. in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510; GAMBLE, Fl. Pres. Madras V (1923) p. 919; RIDLEY, Fl. Malay Penins. II (1923) p. 463; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 370; id. in Philipp. Journ. Sc. XXIX (1926) p. 414; HEYNE, Nutt. Pl. ed. 2 (1927) p. 1306; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 530 — *Q. Quamoclit* (L.) BRITTON in BRITTON & BROWN, Fl. North. Unit. States III (1898) p. 22.

A glabrous twiner (rarely prostrate); leaves petiolate; petiole 8—40 mm long, at base often with pseudo-stipules (small leaves of the axillary shoot); blade ovate or oblong in outline, 2—10 cm long, 1—6 cm broad, pinnately partite to the midrib, with (8—)10—18 pairs of linear to filiform patent segments, the inferior of which are often bifid. Inflorescences axillary, cymosely 1—few-flowered; the peduncles generally exceeding the leaves, 1.5—10(—14) cm long; pedicels much longer than the calyx, (5—)9—20 mm long, thickened and clavate in fruit; bracts minute, deltoid, acute; sepals slightly unequal, the exterior ones shorter, 3-nerved with verrucose nerves; all oblong to oblong-spathulate, obtuse, mucronulate somewhat below the apex, outer sepals (without mucro) 4—4.5 mm, inner ones (without mucro) 5—6 mm long, mucro ¾—1 mm; margins of the sepals pale; corolla red (or sometimes white[2])), hypocrateriform, glabrous, the tube 2.5—3.5 cm long, slightly narrowed towards the base, straight, the limb expanded, 18—20 mm in diam., 5-lobed with acutish, mucronulate lobes, each consisting of a midpetaline band, and 2 narrow strips of the 2-parted connecting fields; stamens and style exserted; stamens inserted near the corolla base; filaments filiform, hairy at their base; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; capsule glabrous, ovoid, obtuse, often crowned by the thickened base of the style, 6—8 mm long, 4-valved with longitudinally splitting valves, 4-celled, 4-seeded; seeds ovoid-oblong, 5—6 mm long, 2.5 mm broad, blackish-brown, marmorate by tufts of minute hairs; dissepiments of the capsule persistent, pellucid, with thickened margin.

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[1]) HALLIER mentions a var. *pectinata* HALL. f., cult. in the Botanic Garden at Buitenzorg. There is as far as I know no specimen of this var. in the herbarium at Buitenzorg.

[2]) var. *albiflora* DON, Gen. Syst. IV (1838) p. 260; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 131.

Malay Peninsula; cultivated in gardens, the species has not established itself outside (Ridley). Prain, 1906, cites a specimen from Penang.

Sumatra, Tapanoeli, Nias, von Römer s. n. (B); Benkoelen, Enggano Island, near Meok, Lütjeharms 5407, July 1936 (B, L).

Java, cultivated and run wild in thickets, hedges, waste places and along borders of cane fields (Backer). Bantam, Prinseneiland, Keulemans s. n. (L); Batavia, Batavia, Vorderman s. n. (B); Sentiong, Backer 35455, Sept. 1903 (B); Buitenzorg, Buitenzorg, Kuhl & van Hasselt s. n. (L); id., cult., van Harreveld s. n., Sept. 1907 (Pa); id., van Steenis s. n., Nov. 1935 (B); along the Tjiliwong, Schiffner 2433, 2435, Nov.—Dec. 1893 (L); Tegal sapi, Bakhuizen van den Brink fil. 1772, Sept. 1922 (B); along the Pakantjilan, Bakhuizen van den Brink 3255, Febr. 1920 (L); id., Bakhuizen van den Brink fil. 136, Febr. 1920 (B); Tjikopo, Boerlage s. n. (L); Kiara Pajoeng, N. of Tjiandjoer, in moist valley, Backer 23624, March 1918 (B); Tjiblagoeng, Soegandiredja 124, March 1900 (B); Panjindangan, between Tjibadak and Pelaboean, as a weed, Bakhuizen van den Brink 1387, Aug. 1909 (B); Pelaboean Ratoe, cult., Boerlage s. n. (L); Priangan, Bandoeng, Visser s. n., June 1928 (L); Semarang, Tjandi, Docters van Leeuwen s. n., Febr. 1911 (B); Djapara-Rembang, Ngarengan, Koorders 33507 β, May 1899 (B, L); id., cult., Koorders 35565 β, June 1899 (B); Kediri, forest district N. Kediri, Toengloer, in teak-wood on stony volcanic soil, Wind 2529, Apr. 1918 (B); between Tritik and Dk. Djeroek, in teak-wood on volcanic tuff, Thorenaar 104, Nov. 1919 (B); Gadoengan, Koorders 22859 β, May 1896 (B); Soerabaja, Soerabaja, Dorgelo 178 (Pa): Malang, G. Weni near Probolinggo, Backer 24286, June 1918 (B); Tengger, Buysman 439, Jan. 1908 (U); Besoeki, near Poeger, Zollinger 243 (L); id., Koorders 21075 β, Oct. 1895 (B, L); id., Koorders 29954 β, March 1898 (B); G. Idjen, N. slope above Bajeman, Backer 24970, June 1918 (B); G. Kendeng. Idjen, N. slope, fissures of rocks, Mrs. Clason—Laarman 104, Febr. 1932 (B): Madoera, Pagantenan, Backer 20464, March 1915 (B); Bangkalan, Backer 18991. Febr. 1914 (B); Poeloe Poeteran, Backer 20817, March 1915 (B).

Borneo, British North Borneo, Apin apin (according to Rendle, 1914).

Celebes, without locality, Forsten 75 (L); Celebes and Dependencies, Bonto Parang, Bünnemeyer 10625, March 1921 (B, L, U); Salajar Islands, Bonerate, Docters van Leeuwen 1438, May 1913 (B, U); P. Boeton, Kambolosoea, Elbert 2691, 6372, Aug. 1909 (L); id., Baoe baoe, Kjellberg 185, Febr. 1929 (B); Toekangbesi Islands, Bimongko, Elbert 2585, 6075, July 1909 (L).

Lombok, Ekos, Mrs. Rensch 404, Apr. 1927 (B).

Soembawa, S. E. Bima, Oei-oet, S. E. slope to Waworadabay, Elbert 3904. Dec. 1909 (L).

Timor, without locality, Forbes 3871 (B, L).

MOLUCCAS, Ternate, FORSTEN s. n., July 1841 (L); Ambon, ROBINSON 403, July—Nov. 1913 (B, L).

NEW GUINEA, Territory of New Guinea, Finschhafen, WEINLAND 20 (B).

BISMARCK ARCHIPELAGO, New Britain, Gazelle Peninsula, Ralum, near Valavolo (according to SCHUMANN & LAUTERBACH).

PHILIPPINE ISLANDS. "This species was introduced from Mexico at an early date by the Spaniards and is now distributed in the settled areas of the Philippines at low and medium altitudes. It is thoroughly naturalized in many regions and is also commonly cultivated for ornamental purposes." (MERRILL, Spec. Blanc.). Luzon, Bulacan prov., Obando, MERRILL, Spec. Blanc. 513, Oct. 1914 (B, L); Sorsogon prov., Irosin, Mt. Bulusan, ELMER 14387, Oct. 1915 (B, L, U); also in Ilocos Norte, Bontoc, Nueva Vizcaya, Union, Pampanga, Rizal, Bataan, Laguna, Camarines and Albay prov. (MERRILL); Mindanao, district of Cotabato, ROBINSON, Bur. of Sc. 11623, June 1910 (L); Bantayan Island, MCGREGOR, Bur. of Sc. 1702, Sept. 1906 (B); Panay, Negros, Cebu, Banguey Island (MERRILL).

Distribution: Circumtropical.

Habitat: Cultivated in gardens and run wild in waste places, hedges, thickets, thin forests and along borders of cane- and rice-fields; between 1 and 1200 m.

Vernacular names: Cypress-vine, red jasmine (HEYNE); kardinaalsbloem (Dutch, BACKER, HEYNE); katilan (Sund., BLUME, MIQUEL); boenga tali (Mal., HEYNE, MIQUEL); ratjik boemi, rintjik boemi (Sund., Java, Buitenzorg, Priangan, BACKER, BAKHUIZEN VAN DEN BRINK, BOERLAGE, HEYNE); songgolangit (Jav., Java, Batavia, Djapara-Rembang, Kediri, Besoeki, BACKER, HEYNE, KOORDERS, THORENAAR); boegada (Celebes, BÜNNEMEYER); cabello de angel (Philippines, Spanish, MERRILL); malabokbok, agoho, agau (Philippines, Tagálog language, MERRILL); lumpitan (Philippines, Magindanáo language, MERRILL); malmarama, pirospiros (Philippines, Cebu Bisáya language, MERRILL); sailatan, silauak-ankambing (Philippines, Súlu language, MERRILL); tartaraok, tentenedór (Philippines, Ilóko language, MERRILL). See also DE CLERCQ-PULLE, Nieuw Plantk. Woordenb. ed. 2 (1927) p. 188, under *Quamoclit pinnata* BOJ.

Use: Cultivated for ornamental purposes. See WATT and HEYNE, l. l. c. c.

Section 6. **Eriospermum** HALL. f.

HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 149; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 133.

Description see p. 484.

31. Ipomoea digitata L., Syst. ed. 10 (1759) p. 924; CHOISY in

DC., Prodr. IX (1845) p. 389; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 202; FORBES, Wander., Germ. ed. II (1886) p. 222; VIDAL Y SOLER, Rev. Plant. Vasc. Philipp. (1886) p. 196; SCHUM. & HOLLR., Fl. Kais. Wilh. Land (1889) p. 115; WATT, Dict. Econ. Prod. India IV (1890) p. 484; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 212; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 516; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1056; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 189; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 239; RIDLEY, Fl. Malay Penins. II (1923) p. 460; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 364; id. in Philipp. Journ. Sc. XXIX (1926) p. 414; DOCTERS VAN LEEUWEN in Ann. Jard. Bot. Buitenz. XLVI—XLVII (1936) p. 405 — *Convolvulus paniculatus* L., Spec. Pl. ed. 1 (1753) p. 156; ROXB., Fl. Ind. ed. CAREY, I (1832) p. 478 (*C. paniculatus* WILLD.); MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 63; id., Spec. Blanc. (1918) p. 323 — *Ipomoea paniculata* (L.) R. BR., Prodr. Fl. Nov. Holl. ed. 1 (1810) p. 486, non BURM., 1768; BL., Bijdr. (1825) p. 709; SPANOGHE in Linnaea XV (1841) p. 340; BENTH., Fl. Austr. IV (1869) p. 414; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 413; HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 149; id. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 379; id. in Meded. 's Lands Pl. t. XIX (1898) p. 543; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; SCHUM. & LAUTERB., Fl. Deutsch. Schutzgeb. (1901) p. 517; PRAIN in Journ. As. Soc. Beng. LXXIV (1906) p. 312; MERRILL in Philipp. Journ. Sc. I, Suppl. (1906) p. 119; KOORDERS, Exk. fl. Java III (1912) p. 120; MERRILL in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510; GAMBLE, Fl. Pres. Madras V (1923) p. 918 — *Batatas paniculata* (L.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 436; id. in DC., Prodr. IX (1845) p. 339; ZOLL., Syst. Verz. 2. Heft (1854) p. 128; MIQ., Fl. Ned. Ind. II (1857) p. 599.

A large perennial twiner, sometimes prostrate; roots tuberous; stems terete, glabrous; leaves petiolate; petiole mostly shorter than the blade, smooth or minutely muricated, longitudinally sulcate above, 3—10 cm long; blade glabrous, orbicular in outline, palmately divided to or mostly beyond the middle, very rarely entire or shallowly lobed, more or less cordate or truncate at the base; dimensions of the blade 6—14 × 6—15 cm; segments (3—)7(—9), lanceolate to ovate, entire, acuminate with an acute or blunt, minutely mucronate top; the middle lobe 5—9 cm long, 1.5—3 cm broad, the lateral lobes shorter. Inflorescences axillary, peduncled; peduncles generally longer than the petioles, terete but often angular at the top, glabrous, cymosely branched at the top, few- to many-flowered, 2.5—20 cm long; pedicels longer than the calyx, terete, glabrous, 9—25 mm long; flower buds globular; sepals equal or the exterior ones shorter, all orbicular or the exterior ones narrower, oblong to broad-elliptic, obtuse, concave, coriaceous, 6—11 mm long, pale-green, glabrous; corolla pale-lilac, the tube darker lilac inside, funnel-shaped, the tube cylindrical, narrowed at the base, the limb patent; length of corolla 5—6 cm, width of limb 6—7 cm; stamens and style included; stamens inserted 5—7 mm above the corolla base; filaments filiform, unequal, white hairy at the base; anthers linear, sagittate, 5—6 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk low, annular. Capsule ovoid, obtuse, glabrous, 12—14 mm high, opening by 4 thin, pale brown valves, 2-celled, 4-seeded; seeds black, with long woolly-sericeous, white, easily detaching hairs.

Malay Peninsula. On waste ground near villages; wild probably on the sea-shore (Ridley). In Penang, Perak, Pahang and Singapore (Prain, Ridley).

Sumatra, without locality, Korthals s. n., 111, 112 (L); Lampong Districts, Verlaten Island, *Casuarina*-forest, Docters van Leeuwen 4114, Apr. 1920 (herb. D. v. L.); id., mixed forest, Docters van Leeuwen 11622, Febr. 1928 (herb. D. v. L.); Riouw and Dependencies, Riouw Archipelago, P. Dompak near P. Bintan, Bünnemeyer 6417, June 1919 (B); P. Oedjan near P. Bintan, Bünnemeyer 6440, June 1919 (B, L); Lingga Archipelago, P. Redjai, Bünnemeyer 7624a, Aug. 1919 (B, U).

Java, without locality, Horsfield s. n. (U); Korthals 173, 239 (L); Kuhl & van Hasselt 193 (L); Batavia, Weltevreden, Kramat Sentiong, Backer 32311, Dec. 1902 (B); Weltevreden, cult., Backer 32312, Apr. 1905 (B); Krawang, Korthals 173 (L); Buitenzorg, Buitenzorg, Bakhuizen van den Brink fil. 2702, June 1923 (B); id., cult. in the Botanic Garden XV. K. B. X. 3 (B); XV. K. B. XII. 6 (B); XV. K. C. V. 12 (B); Pledang, cult., Koorders 40182 β, March 1903 (B, L); Karanghawoe, W. of Pelaboean Ratoe, van Steenis 2882, May 1929 (B); Magelang, Keboemen, Brinkman 92, Apr. 1929 (B); Semarang, forestry Telawa, on marl, Beumée 4961, Jan. 1920 (B); Djapara-Rembang, N. of Randoe, Blatoeng, Backer 6588, Jan. 1913 (B); Jogjakarta, Wonosari, Backer 2606, Apr. 1912 (B); Madioen, Ngawi, Backer 6680, Febr. 1913 (B); between Tegalombo and Slahoeng, Backer 3429, Apr. 1912 (B); Madoera, Bangkalan, Backer 19114, Febr. 1914 (B); P. Poeteran, Backer 20768, March 1915 (B); between Rapa and Karang Pinang, Backer 20081, March 1915 (B); hills S. W. of Tamberoe, Backer 20516, March 1915 (B); Kangean Islands, Kangean, Gelaman, Backer 27152, March 1919 (B); id., Kangean, Kajoe Waroe, Backer 28185, Apr. 1919 (B); id., Kangean, Pabean, Dommers 117, Oct. 1919 (B); id., Kangean, S. E. of Tambajangan, Backer 27724, March 1919 (B); id., Paliat, Backer 29395, May 1919 (B); id., Saoebi, Backer 28386, Apr. 1919 (B); id., Sapapan, Backer 28485, Apr. 1919 (B).

Borneo, without locality, Korthals 104 (L); Korthals 240 (B); W. Division, Pontianak, Sei Raja, bank, Mondi 40, March 1931 (B, L); Kapoeas, TEYSMANN 8294 (B); Soengai Sambas, HALLIER 1015 (B, L); S. and E. Division, Bandjermasin, KORTHALS 104 (L).

CELEBES, Celebes and Dependencies, Tjimpaga, RACHMAT 168 (exped. VAN VUUREN), July 1913 (B, L); Mapili, RACHMAT 366 (exped. VAN VUUREN), Aug. 1913 (B, L); P. Moena, shore, on limestone, KJELLBERG 52, Febr. 1929 (B); Manado, near and in Manado, KOORDERS 16584 β (B, L); Oetan aris near Manado, fertile volcanic soil, KOORDERS 16583 β, Dec. 1894 (B, L); near lake Tondano, KOORDERS 16582 β, Jan. 1895 (B, L); Tondano, FORSTEN 9, May 1840 (L); Gorontalo, FORSTEN 3 (L); Talaud Islands, Nanoesa, Merampi, LAM 3434, June 1926 (B).

TIMOR, without locality, SPANOGHE s. n. (L).

MOLUCCAS, Ceram, Waroe, KORNASSI 978, Febr. 1918 (B); Kelang Island, Sole, KORNASSI 1347, May 1918 (B, L, U); Ambon, ROBINSON 1823, July—Nov. 1913 (L); Kai Islands, JAHERI 190 (B).

NEW GUINEA, Netherlands New Guinea, without locality, KOCH s. n. (L); Merauke, VERSTEEG 1962, Nov. 1907, leaves entire to very shallowly lobed (B); Territory of New Guinea, Hatzfeldthafen, HOLLRUNG 371 (B); Constantinhafen; Ramu R. (according to SCHUMANN & LAUTERBACH); Papua, W. Division, Daru Island, BRASS 6241, March 1936 (L).

PHILIPPINE ISLANDS. "This species is widely distributed in the Philippines, occurring in thickets near the sea or more or less within the influence of brackish water" (MERRILL, Spec. Blanc.). Luzon, Bulacan prov., Obando, MERRILL, Spec. Blanc. 392, Oct. 1914 (B, L); Bataan prov., Lamao River, Mt. Mariveles, BORDEN, For. Bur. 2020, Sept.—Oct. 1904 (B); Rizal prov., Manila, MERRILL 7129, Aug. 1910 (L); id., id., RAMOS, Bur. of Sc. 12149, Sept. 1910 (L). Also in Culion, Coron, Mindanao and Banguey Island (MERRILL).

Distribution: Circumtropical.

Habitat: In thickets on the beach, but also in the interior, in waste places, thickets, hedges, thin forests (savannah-forests, teak-woods), alang-fields and along waysides; also cultivated; between 0 and 700 m.

Vernacular names: kaledek hutan, kangkong laut (Malay Peninsula, RIDLEY); romboet, rabet (Java, Kangean, DOMMERS); pala poeang (S. Celebes, RACHMAT); kangkoeng oetan, beteta pante (Celebes, Manado, Tomboeloe language, KOORDERS); ondo (Talaud Islands, LAM); bulakan, puntas puntas (Philippines, Tagálog language, MERRILL); kamkamóte (Philippines, Ilóko language, MERRILL).

Use: ROXBURGH, l. c.: "Cattle eat it. The root is cathartic, and as such used by the natives where it grows." See WATT, l. c.

Remarks. HALLIER in Versl. 's Lands Pl. t. 1895 (1896) p. 130 mentions a var. *fol. variegatis,* a variety with variegated leaves, cultivated in the Botanic Garden at Buitenzorg (XV. H. 5 and 5A).

32. Ipomoea asterophora VAN OOSTSTR., nov. spec.

Description of the type specimen, BRASS 7437 (L) from Papua (the data in parentheses have reference to the other specimens mentioned below):

Planta volubilis, caulibus teretibus, substriatis, praesertim ad nodos pilis stellatis nonnullis praeditis, glabrescentibus. Folia petiolata, petiolis tenuibus, pilis stellatis praeditis, glabrescentibus, 3—5.5(—8) cm longis, late ovata vel orbicularia, (7—)9(—14) cm longa, (7.5—)9—10(—11) cm lata, apice attenuata vel breviter acuminata, acumine late triangulare obtuso vel subemarginato, minutissime mucronato, basi late cordata, margine integra vel subundulata vel leviter (vel profunde) lobata, lobis utrinque 1—2 late (vel anguste) triangularibus apice obtusis, utrinque pilis stellatis numerosis vestita, nervis lateralibus utrinque 3—4, ex quibus c. 2—3 e basi orientibus, valde curvatis. Inflorescentiae axillares, pedunculatae, apice cymoso-ramosae, (2—)6-florae, pedunculis teretibus vel subangulatis, c. 6(—15) cm longis, cum ramis pilis stellatis nunnullis praeditis vel glabris; bracteis minutis deciduis, pedicellis gracilibus calyce longioribus, pilos stellatos nonnullos gerentibus, (10—)12—18(—20) mm longis. Sepala valde concava, apice rotundata, subcoriacea, glaberrima (vel exteriora pilis stellatis nonnullis praeditis) exteriora subbreviora, elliptica, 7—9 mm longa, interiora orbicularia, 9—10 mm longa. Corolla purpureo-alba, intus basin versus obscure purpurea, campanulato-infundibuliformis, basi in tubum breviter cylindricum c. 7—8 mm longum, abrupte attenuata, 7 cm longa, glabra. Stamina brevia, inclusa, filamentis circiter 7 mm supra basin corollae insertis, inaequalibus, basi pauce dilatata breviter pilosa, antheris oblongis, sagittatis, c. 4.5 mm longis. Discus annularis, crassus, c. 0.5 mm altus. Ovarium glabrum, stylo incluso, filiformi, glabro, stigmate biglobulari papilloso.

JAVA, Madoera, Kangean Islands (according to the label of a specimen numbered XV. G. 73 and cultivated in the Botanic Garden at Buitenzorg under the name of *I. longiflora* R. BR.). The original locality of a specimen XV. K. B. XI. 10, cultivated in the Botanic Garden at Buitenzorg under the name of *I. Hardingii* PAXT. is unknown (see remarks).

MOLUCCAS, Ceram, S. E. Ceram, Toem, KORNASSI 875, Jan. 1918 (B).

NEW GUINEA, Netherlands New Guinea, Noord River, VERSTEEG 1041, June 1907 (B); Papua, Fly River, Oroville Camp, 30 miles above D'Albertis Junction, common in seral[1]) shrubberies of muddy riverbanks, BRASS 7437, Aug. 1936 (L, *type*).

Distribution: Kangean Islands, Moluccas, New Guinea.

Habitat: River banks; between 0 and 100 m.

Remarks. 1. The specimen VERSTEEG 1041 consists of 2 branches, one with entire, the other with 3-lobed leaves. These 3-lobed leaves are lobed to or beyond the middle; the middle lobe is broad-ovate, attenuate towards the apex, with an obtuse point, the lateral lobes are much nar-

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[1]) This orthography on the label! Possibly erroneous for "tidal"?

rower and slightly falcate. Kornassi 875 has entire leaves, perhaps with a somewhat undulate margin. The cultivated specimens have the leaves partly entire, and partly 3-lobed. The specimen XV. K. B. XI. 10 bears the name *I. Hardingii* Paxt. and indeed fairly well agrees with the original plate of that species in Paxton, Mag. Bot. XI (1844) p. 217. *I. Hardingii* has been described as a hybrid of *I. rubrocoerulea* (= *I. violacea* L.) and *I. Horsfallhae.* It is, in my opinion, rather doubtful whether it indeed represents a product of hybridization of these two, so very different species.

2. *I. asterophora* seems to be very closely related to *I. digitata* L., from which species is mainly differs in the possession of stellate hairs. *I. digitata* L. is mostly entirely glabrous, but I saw some South American specimens with a short pubescence of simple hairs. The South-American *I. bonariensis* Hook., another closely related species has the same stellate indument, but differs in the form of the leaves and especially in the more coarse and straight main nerves of these.

Some other specimens from New Guinea have a much less dense pubescence which is especially developed on the stems, the petioles and the main nerves of the leaves beneath (Feuilletau de Bruyn 162) or in extreme cases only at or near the nodes of the stems (Docters van Leeuwen 9599 and 11362):

var. **subglabra** van Ooststr., nov. var.

Description of the type specimen, Feuilletau de Bruyn 162 (L) from Netherlands New Guinea (the data in parentheses have reference to the other specimens mentioned below):

Caules pilis stellatis dense vestites (vel ad nodos pilis stellatis nonnullis praedites ceterum glabri); folia subtus in nervis pilos stellatos gerentia (vel utrinque glabra) petiolis pilis stellatis vestitis (vel basin versus pilis stellatis nonnullis praeditis vel glabris); inflorescentiae subglabrae vel glabrae.

New Guinea, Netherlands New Guinea, Mamberamo, Feuilletau de Bruyn 162, Oct. 1914 (B; L, *type*); Mamberamo near Albatros Bivouac, Docters van Leeuwen 9599, July 1926 (B); Otken River, Docters van Leeuwen 11362, Nov. 1926 (B).

Distribution: New Guinea.

Habitat: Riverbanks; up to 60 m.

Remarks. 1. I suppose that an old and fragmentary specimen collected by Teysmann, n. 12114, in Celebes, on rocks near Pangkadjene, belongs here too, though the stellate pubescence is totally lacking.

2. All specimens mentioned under var. *subglabra* have the leaf blades

thinly herbaceous, broadly ovate, acuminate at the apex with narrow, obtuse acumen and broadly cordate at the base; the margin is entire or shallowly undulate; length of the blade 9—16 cm, width 7—12 cm; petioles 4—6.5 cm; peduncles 7—12 cm; in some cases the inflorescence is up to 5 times dichasially ramified, up to 25 cm long and many-flowered.

33. **Ipomoea Horsfalliae** HOOK., Bot. Mag. (1834) t. 3315; RIDLEY, Fl. Malay Penins. II (1923) p. 462.

A large, glabrous twiner; stems terete, finely striate in dry specimens; leaves petiolate; petiole shorter than the blade, 2.5—10 cm long; blade deeply palmately lobed to beyond the middle or to the base into 3—5 segments; middle segment generally much larger than lateral ones, ovate, elliptic or elliptic-oblong, generally attenuate towards both ends and acuminate at the apex with acute or obtusish, mucronulate point, lateral segments ovate-lanceolate, lanceolate or linear-lanceolate, margins of the segments entire or coarsely dentate or crenate; length and width of the leaf blade 5—14 cm. Inflorescences axillary, few- to several-flowered, 8—20 cm long; the peduncle 1.5—7.5 cm long, widely cymosely ramified; pedicels as long as or longer than the sepals, 8—15 mm long; sepals subequal or the exterior ones slightly shorter, elliptic or ovate-elliptic, obtuse, concave, 7—9 mm long; sepals green at the base, for the rest red purple or purplish black; corolla red or red-purple, hypocrateriform, the tube gradually widened towards the top; length of corolla c. 5 cm, tube c. 3.5 cm long, c. 9 mm in diam. (VAN STEENIS), limb c. 3.5 cm in diam., 5-lobed; stamens and style exserted; stamens inserted c. 7 mm above the corolla base; filaments densely villous at the base; anthers oblong, sagittate, in open flower c. 5 mm long; ovary glabrous; style filiform, glabrous; disk cupular, nearly 1 mm high.

MALAY PENINSULA. Cultivated in gardens (RIDLEY).

JAVA, Batavia, Weltevreden, cult., BACKER 32339, Apr. 1905 (B); Buitenzorg, Buitenzorg, cult. in the Botanic Garden, XV. H. 23 (B); XV. K. B. XI. 1 (B); XV. K. B. XIII. 1, VAN HARREVELD s. n., Aug. 1907 (Pa); cult., VAN STEENIS 5093, Jan. 1932 (B); Kotaparis, cult., BAKHUIZEN VAN DEN BRINK fil. 3236, March 1924 (B).

Distribution: West Indian Islands; cultivated throughout the tropics.

Vernacular name: Roode Stephanotis (red Stephanotis) (Java, BAKHUIZEN VAN DEN BRINK fil.).

Use: Cultivated in gardens for ornamental purposes.

34. **Ipomoea fragrans** (BOJ.) BOJ. ex CHOISY in DC., Prodr. IX (1845) p. 341 in syn., p. 393; HALL. f. in ENGL., Bot. Jahrb. XVIII

(1893) p. 153; Merrill, Enum. Philipp. Fl. Pl. III (1923) p. 365 — *I. lilacina* Bl., Bijdr. (1825) p. 716, non Schrank, 1822; Choisy in DC., Prodr. IX (1845) p. 369; Hall. f. in Bull. Herb. Boiss. V (1897) p. 380; Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. IV, 2 (1905) p. 187; Koorders, Exk. fl. Java III (1912) p. 121; Merrill in Journ. Roy. As. Soc. Str. Br. Spec. Numb. (1921) p. 510 — *Pharbitis fragrans* Boj., Hort. Maurit. (1837) p. 227; Choisy in DC., Prodr. IX (1845) p. 341 — *Ipomoea riparia* G. Don, Gen. Syst. IV (1838) p. 265; Choisy in DC., Prodr. IX (1845) p. 389 — *I. Baclei* Choisy in Mém. Soc. Phys. Genève VIII (1838) p. 60, t. II; id. in DC., Prodr. IX (1845) p. 381 — *I. Lindleyi* Choisy in DC., Prodr. IX (1845) p. 371 — *I. Parkeri* Choisy in DC., Prodr. IX (1845) p. 381 — *I. Parkeri* Choisy var. *subsericea* Meissn. in Mart. Fl. Bras. VII (1869) p. 284; van Ooststr. in Pulle, Fl. Surin. IV (1932) p. 92 — *I. oxyphylla* Baker in Kew Bull. (1894) p. 71 — *I. Stuhlmannii* Dammer in Engl., Pfl. Ost-Afr. C (1895) p. 333.

A perennial twiner; stems terete, finely striate when dry, densely short-pilose with soft white hairs; leaves petiolate; petiole slender, 3—10(—12) cm long, pilose like the stems; blade broad-ovate to orbicular, acuminate at the apex with acute or obtuse mucronulate point, broadly cordate at the base, densely pilose beneath, much more sparsely so and glabrescent above, 5—12 cm long, 4—10 cm wide; nerves 7—9 pairs on each side of the midrib. Inflorescences axillary, pedunculate, the peduncle pilose like the stem, often glabrous or nearly so in the lower portion, terete, 2—12 cm long, cymosely 1—few-flowered with very short branches, flowers consequently subumbellate; pedicels pilose, mostly longer than the calyx, 7—14 mm long; sepals equal in length, 7—10 mm long, the two outer ones elliptic-oblong, acute, shortly pilose, the inner ones broader, ovate-elliptic, less acute; corolla pink or purple with darker centre, funnel-shaped, 4—5 cm long, the midpetaline bands with sericeous hairs outside; stamens and style included; stamens inserted c. 4 mm above the corolla base; filaments unequal, filiform, hairy at the dilated, flattened base; anthers lanceolate, sagittate, 4 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular. Capsule globose, 12 mm high, glabrous, 4-valved (valves brown outside, whitish inside), 2-celled, 4-seeded; seeds 6 mm long, white-villous.

Sumatra, Tapanoeli, Toba, Oeloean, Ouwehand 146, March 1896 (B).

Java, without locality, Blume 1097 (L, *type of I. lilacina* Bl.); Priangan, G. Papandajan, Korthals 275 (L); between Kali poetjang and Pada Herang, Backer 4517, Sept. 1912 (B); Rawah Lakbok, Frank 5, June 1933 (B); Semarang, Rawah Pening, Backer 30200, March 1920 (B); id., Koorders 36225β, May 1899

(B); id., Miss POLAK 62, Aug. 1930 (B); Malang, Djatiroto, BACKER 7832, May 1913 (B); Besoeki, Poeger, KOORDERS 21076β, Oct. 1895 (B).

BORNEO, without locality, KORTHALS 126 (L); W. Division, P. Lemoekoetan, HALLIER 279 (B); S. and E. Division, Bandjermasin, KORTHALS 238 (B, L).

BALI, near lake Batoer, VAN STEENIS 7931, Apr. 1936 (B).

PHILIPPINE ISLANDS; in thickets and bordering fresh-water swamps (MERRILL). Luzon, Laguna prov., Los Baños, GATES & OTANES, Bur. of Sc. 22419, Dec. 1914 (B, L); id., in the hot springs swamp, lake margin, GATES & OTANES, Bur. of Sc. 7758, Dec. 1914 (L); Mindanao, Lanao, Cotabato (MERRILL).

Distribution: Tropical America (British Guiana, Surinam); tropical Africa, Madagascar and adjacent islands, Malay Archipelago, Philippine Islands.

Habitat: In marshes, along rivers and in marshy forests, occasionally in waste places; between 1 and 1000 m.

Remarks. *Ipomoea lilacina* BL., 1825 is illegitimate, being a later homonym of the validly published *I. lilacina* SCHRANK, 1822. According to MERRILL, 1923, the valid name is *I. fragrans* (BOJ.) BOJ. ex CHOISY, the type of which is unknown to me. Moreover, I am not responsible for the various synonyms mentioned above; I have derived them from HALLIER (in ENGL., Bot. Jahrb. XVIII (1893) p. 153) and from BAKER & RENDLE, l. c., with exception of *I. Parkeri* CHOISY and its var. *subsericea* MEISSN., the types of which I could compare with BLUME's type of *I. lilacina*.

35. **Ipomoea illustris** (CLARKE) PRAIN, Beng. Pl. II (1903) p. 735; PRAIN in Journ. As. Soc. Bengal LXXIV (1906) p. 314; RIDLEY, Fl. Malay Penins. II (1923) p. 460; RENDLE in Journ. Bot. LXIII, Suppl. (1925) p. 72 — *I. campanulata* L. var. *illustris* CLARKE in HOOK. f., Fl. Brit. Ind. IV (1883) p. 211; PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 107; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 253.

A twiner (rarely prostrate and rooting); stems woody, pale fulvous, longitudinally wrinkled to angular, glabrous or pubescent, smooth or rarely muricated. Leaves petiolate; petiole slender, 3—8 cm long, smooth or rarely muricated, glabrous or pubescent; blade ovate, broad-ovate or orbicular, sometimes ovate-oblong, acuminate at the apex, acumen short to long and narrow, acute or obtusish, mucronulate; base shallowly cordate to truncate; margin entire or undulate; surfaces glabrous or lower surface pubescent; length of blade 6—15 cm, width 3.5—11 cm; nerves 10—15 on each side of the midrib. Inflorescences axillary, pedunculate, cymosely 1—several-flowered; peduncle stout, 2.5—8 cm long, glabrous or rarely pubescent; pedicels 10—15, sometimes to 25 mm, in fruit to

28 mm long, angular, thickened towards the calyx, glabrous or rarely pubescent; sepals glabrous or rarely pubescent, coriaceous, with pale thinner margins, orbicular with rounded top, the outer ones 7—10, the inner ones 10—12 mm long, in fruit respectively up to 14—15 and up to 18 mm long; corolla reddish purple with darker centre, paler without, sometimes pale purple or rarely white, up to 10 cm long, tubular to funnel-shaped, contracted at about 1.5 cm above the base; stamens and style included; filaments inserted c. 12 mm above the corolla base, filiform, hairy at the base; anthers linear-lanceolate, c. 5 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular; disk low, annular. Capsule ovoid, c. 1.5 cm high, brown, 4-valved, 2-celled, 4-seeded; seeds black, 8—9 mm long, with long sericeous hairs along the margins.

MALAY PENINSULA. On sea-shores, rare (RIDLEY). Penang, Adang Islands (PRAIN, RIDLEY).

SUMATRA, Atjeh and Dependencies, Simaloer, ACHMAD 1028, Apr. 1919 (B, L); id., JACOBSON 2095, Aug. 1913 (B); Tapanoeli, Nias, VON RÖMER s. n. (B); Lampong Districts (according to RENDLE, 1925).

JAVA, Bantam, Tjarita, BOEDIJN 1248A, May 1931 (B); Pasaoeran, BACKER 7161, March 1913 (B); id., BACKER 7273, March 1913 (B); Malingping, BACKER 1404, June 1911 (B); Batavia, Tandjong Priok, without collector's name (B); id., along canal, RAAP 491, June 1894 (L); id., HALLIER s. n., June 1896 (B); Buitenzorg, Oedjoeng Genteng, BACKER 17547, Nov. 1914 (B); Pelaboean Ratoe, BACKER 18396, Dec. 1914 (B); Baleh Kambang (Zandbaai), BACKER 802, Dec. 1911 (B); Banjoemas, bank of Serajoe near the sea, BACKER 4546, Sept. 1912 (B); Noesa Kambangan, KOORDERS 27051β, Febr. 1897 (L, mixed with *I. Pes-caprae* (L.) SWEET); id., N. side, opposite Tjilatjap, BACKER 20995, May 1915 (B); id., Brambang, AMDJAH 46, June 1909 (B); Kediri, Prigi, BACKER 11893, Febr. 1914 (B); near bay of Domas, W. of Prigi, BACKER 11968, Febr. 1914 (B).

BORNEO, W. Division, P. Lemoekoetan, HALLIER 364 (B); Karimata Islands, P. Pelapis, Tiangbalai, MONDI 137, March 1931 (B, L).

CELEBES, Manado, between Singkel and Boeha, on fertile volcanic sand, KOORDERS 16581 β, Jan. 1895 (B, L).

BALI, E. of Gilimanoek, VAN STEENIS 7574, Apr. 1936 (B).

MOLUCCAS, Ceram, Way Sala, KORNASSI 1256, May 1918 (B).

NEW GUINEA, Papua, W. Division, Daru Island, in savannah-forest, BRASS 6446, Apr. 1936 (L).

PHILIPPINE ISLANDS, Luzon, prov. of Bulacan, RAMOS, Bur. of Sc. 2028, Dec. 1914 (B, L).

Distribution: British India, Ceylon, Indo-China, Malay Peninsula, Andamans, Malay Archipelago, Philippines, New Guinea.

Habitat: Sea-shores, and in thickets and along edges of forests near the sea; between 1 and 25 m.

Vernacular names: olor baoewo oeding (Sumatra, Simaloer, ACHMAD); blaran (Java, Pekalongan, BEUMÉE); boedokkin (Celebes, Manado, Bantik language, KOORDERS).

Remarks. This species is generally known in systematic literature under the name of *Ipomoea campanulata* L. (L., Spec. Pl. ed. 1 (1753) p. 160). LINNAEUS gives the following description of it:

> IPOMOEA foliis cordatis, pedunculis multifloris, perianthio exteriore orbiculari, corollis campanulatis lobatis.
>
> Adamboe *Rheed. mal.* 11. *p.* 115. *t.* 56.
>
> *Habitat in* India.
>
> *Corolla crassior; quam in reliquis; sub Perianthio quinquepartito, aliud perianthium minus orbiculatum integerrimum.*

From this description it is clear that the plant which LINNAEUS had before him cannot be a representative of the genus *Ipomoea,* or even of the family Convolvulaceae, as no Convolvulacea has a 5-partite inner perianth (corolla) together with a smaller, orbicular, entire outer one (calyx). Fortunately the herbarium of LINNAEUS, preserved at the Linnean Society at London, throws light upon this question. It contains, as HALLIER [1]) states, under the name of *Ipomoea campanulata* a specimen of *Thespesia populnea* (L.) SOLAND., a Malvacea, fully agreeing with LINNAEUS's description.

LINNAEUS himself already knew this *Thespesia* and described it in the first edition of his Species Plantarum as *Hibiscus populneus* L. It is a remarkable fact that LINNAEUS considered a so totally aberrant species, as a representative of the genus *Ipomoea.* The synonym Adamboe RHEEDE, mentioned by LINNAEUS, appears to be a real Convolvulacea, and most probably must be treated as to belong to *Stictocardia tiliaefolia.* Especially the form of the fruit enclosed by the enlarged sepals figured and described by RHEEDE has lead to this opinion.

From the above I hope that it will be clear that *Ipomoea campanulata* L. can only be treated as a synonym of *Thespesia populnea* (L.) SOLAND. The right name for the Convolvulaceous species treated as *I. campanulata* L. is *I. illustris* (CLARKE) PRAIN.

Concerning the name *Stictocardia tiliaefolia* can be said that MERRILL wrongly changed this name into *S. campanulata* (L.) MERRILL, on account of the fact that LINNAEUS used the name *I. campanulata* for RHEEDE's Adamboe.

As has been pointed out under *Ipomoea tuba* (this paper, p. 577) the specimen mentioned by LINNAEUS the son, in his Supplement, under

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[1]) HALLIER, H. in Meded. Rijksherb. Leiden 1 (1910) p. 26.

Convolvulus grandiflorus belongs to *Stictocardia tiliaefolia.* HALLIER based his *Stictocardia tiliaefolia* upon *Rivea tiliaefolia* CHOISY and the synonyms mentioned by CHOISY in DC., Prodr. IX (1845) p. 325, as appears from his citation of *S. tiliaefolia* (CHOISY) HALLIER, to which has been added as a synonym among others, *Rivea tiliaefolia* CHOISY in DC., Pr. 9 p. 325 *c. syn.* The oldest of these synonyms is *Convolvulus tiliaefolius* DESR., 1791.

As *Convolvulus grandiflorus* L. f., 1781, has been published before *Convolvulus tiliaefolius* DESR., 1791, the former name has priority. There exists, however, already a *Convolvulus grandiflorus* JACQ., published in 1776, so that the right name for the *Stictocardia*-species remains *S. tiliaefolia* (DESR.) HALL. f.

36. **Ipomoea crassicaulis** (BENTH.) B. L. ROBINSON in Proc. Amer. Acad. LI (1916) p. 530; id. in Contrib. Gray Herb., New Series XLV (1916) p. 530 — *Batatas? crassicaulis* BENTH., Voy. Sulph. (1844) p. 134; WALP., Rept. VI (1846—47) p. 530 — *Ipomoea fistulosa* MART. ex CHOISY in DC., Prodr. IX (1845) p. 349; HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512.

A shrub, 1—2 m high, erect or ascending, or sometimes twining, and to 5 m high. Branches thick, terete to angular, fistulose or solid, the older parts lenticellate, pale greyish, the younger parts densely short-pubescent, glabrescent. Leaves petiolate; petiole slender, 2.5—15 cm long; blade ovate or ovate-oblong, acuminate at the apex, with an acute or obtuse, mucronulate acumen, cordate to truncate at the base, 6—25 cm long, 4—17 cm broad; young leaves densely pubescent on both surfaces, adult leaves pubescent below, especially on the nerves, glabrous or nearly so above; midrib below with 2 glands at the base of the leaf-blade [1]; lateral nerves 7—9 on each side of the midrib; secondary nerves many, parallel. Inflorescences axillary, pedunculate, cymosely branched at the apex, several- to many-flowered; peduncle stout, terete, pubescent or glabrous, 5—15 cm long; bracts minute, ovate, obtuse, deciduous; pedicels longer than the calyx, puberulent; sepals subequal or the exterior ones slightly shorter, 5—6 mm long, orbicular, broadly rounded at the top, puberulent; calyx with 5 extrafloral nectaries between the bases of the sepals [1]; corolla pink or pale lilac, inside often darker towards the base, tubular to funnel-shaped, 7.5—9 cm long, the limb 10—12 cm in diam. (BACKER), the tube constricted close to the base, the tube and the midpetaline bands farinose outside, the connecting fields glabrous or nearly so; stamens and style included; stamens inserted c. 6 mm above the base of the corolla; filaments very unequal, 2 longer and 3 shorter ones, filiform, white, hairy at the dilated purple base; anthers white, linear, sagittate, c. 8 mm long; ovary puberulent; style filiform, the basal part puberulent; stigma biglobular. Capsule ovoid, mucronate, 1.5—2 cm long, pale brown, finely puberulent in the basal portion, 4-valved, incompletely 4-celled or 2-celled, 4- or less-seeded; seeds black, the whole surface long sericeo-villose.

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[1] See NIEUWENHUIS — VON ÜXKÜLL-GÜLDENBANDT in Ann. Jard. Bot. Buitenz. XXI (1907) p. 254, t. 24, fig. 40 and 43.

Sumatra, East Coast, E. of Medan, Lörzing 3162, Oct. 1914 (B, L); Kampongbaroe, S. of Medan, Lörzing 3504, Febr. 1915 (B); Riouw and Dependencies, Lingga Archipelago, P. Singkep, Manggoe, Bünnemeyer 7169, Aug. 1919 (B).

Java. According to Backer introduced in Java many years ago and cultivated as an ornamental plant; frequently escaped from culture and naturalized at low altitudes along rivers, canals, locally abundant. Batavia, Weltevreden, G. Sahari Sentiong, Backer 32303, May 1902 (B); Pal Merah, S. W. of Weltevreden, Backer 32299, May 1903 (B); Buitenzorg, Sindanglaja, cult., Koorders 42175 β (B); Tjiomas, Forestry Experiment Station 3929 and 3930, March 1926 (B); Tjidadap, S. of Tjibeber, cult., Winckel 1911 β, Dec. 1923 (B); Buitenzorg, cult. in the Botanic Garden, XV. H. 14 (B); X. F. 72 (L); s. n. (L); Pekalongan, Brebes, cult., Backer 15315, Sept. 1914 (B); Kemantran near Tegal, Docters van Leeuwen s. n., Oct. 1909 (B); Semarang, Karangbalong, Lörzing 1699, June 1914 (B); forestry N. W. Wirosari, cult., Beumée 3429, Oct. 1918 (B); Madioen, Padjaran, cult., Altona 6682, Oct. 1925 (B); Saradan, Altona 6682a, Oct. 1925 (B); Soerabaja, Gresik, Dorgelo 1576bis, Jan. 1923 (Pa); sugar-estate Ngelom, Balongdowo, Bovien, herb. Djombang n. 43, Sept. 1923 (Pa); Malang, Pasoeroean, Backer 37285, Oct. 1930 (Pa); Loemadjang, Government physician of Solo s. n., Dec. 1935 (B); Lekok, cult., Nov. 1928 (Pa); Djatiroto, cult., Vermeulen 40, June 1921 (B); Besoeki, Djember, Ultée 10 (B).

Borneo, British North Borneo, without locality, Villamil, Bur. of Sc. 256bis, Nov. 1916—Febr. 1917 (B).

Celebes, Celebes and Dependencies, Palopo, Kjellberg 1941, July 1929 (B).

Moluccas, Ceram, Hatoemete, Kornassi 634 (exped. Rutten), Nov. 1917 (B, L, U).

Distribution: A native of America, where it is known from Mexico, Florida, the West Indies as far as south as Brazil, and Paraguay.

Habitat: Frequently cultivated and run wild along rivers, canals, in moist waste places and along waysides; between 1 and 1000 m.

Vernacular names: klemoet, kangkoengan (Java, according to a note on a label of a specimen collected by the Forestry Experiment Station; Backer, Altona); oela (Java, Madioen, Altona); doean krangkoengan (Java, Malang, according to the Government physician of Solo).

Use: Cultivated as an ornamental plant; the leaves are eaten by the Madurese as a vegetable.

Remarks. 1. According to LÖRZING this species does not produce ripe seeds in Malaysia. It easily propagates by cuttings.

2. Several authors [1]) have used the name *Ipomoea carnea* JACQ. for the Asiatic specimens of this species, most probably wrongly; the species described by JACQUIN and figured by him in his Select. Stirp. Am. (1763) p. 26, t. XVIII, seems to be different.

37. Ipomoea sumatrana (MIQ.) VAN OOSTSTR., nov. comb. — *Convolvulus polyanthus* WALL., Cat. (1828) n. 1378, nomen — *Lettsomia sumatrana* MIQ., Fl. Ned. Ind. Suppl. (1860) p. 560 — *Ipomoea staphylina* R. & SCH. var. *malayana* PRAIN in Journ. As. Soc. Bengal LXIII (1894) p. 106; id. in Journ. As. Soc. Beng. LXXIV (1906) p. 317; RIDLEY, Fl. Malay Penins. II (1923) p. 462.

A large woody, glabrous twiner; stems terete or angular, greyish-brown, fistulose; leaves petiolate; petiole slender, 4—10 cm long; blade rather stiff, ovate, obtuse or acute to short-acuminate at the apex, slightly cordate or truncate at the base, 6—12 cm long and 5—10 cm broad; lateral nerves prominent beneath, 11—14 on each side of the midrib. Inflorescences axillary, 10—15 cm long, paniculate, one or two times racemosely branched, the ultimate partial inflorescences cymose; large inflorescences with leaflike bracts at the base of the lowest branches; peduncle under the lowest branch c. 4—6 cm long; pedicels longer than the calyx, 6—10 mm; outer sepals slightly shorter than inner ones; outer ones broadly ovate, obtuse, c. 3.5—4.5 mm long, coriaceous, inner ones orbicular, broadly rounded, c. 4.5—5 mm long, coriaceous with scarious margin; corolla white, slightly tinged with pink (PRAIN), tubular to funnel-shaped, c. 3—3.5 cm long, glabrous; tube c. 5—6 mm wide; midpetaline areas between the nerves with many minute dark stripes (glands?); stamens and style included; stamens inserted c. 1.5 mm above the corolla base; filaments unequal, filiform, sparsely pilose at the dilated base; anthers oblong, sagittate, in open flower c. 3.5 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular, papillose; disk thick, annular; capsule ovoid, sub-acute, c. 7.5 mm long, 4-seeded; seeds with long silky hairs (PRAIN).

MALAY PENINSULA, Perlis, Kangar, HENDERSON, Singapore Field n. 22925,

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[1]) BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; KOORDERS, Exk. fl. Java III (1912) p. 120; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 271; BACKER, Onkruidfl. Jav. Suikerrietgr. (1931) p. 528.

Nov. 1929 (B); also in Kedah, Penang, Perak and Pahang (PRAIN, RIDLEY). The *type* of *Convolvulus polyanthus* WALL. was collected in Penang.

SUMATRA, West Coast, Soengei Pagoe, TEYSMANN HB. 1150 (B, L; U, *type of Lettsomia sumatrana* MIQ.).

JAVA, Semarang, Salatiga, Kali Taman, DOCTERS VAN LEEUWEN s. n., June 1909 (B).

SOEMBAWA, Batoe Doelang, dry thickets, Mrs. RENSCH 619, May 1927, see remarks (B).

Distribution: Malay Peninsula, Malay Archipelago.

Habitat: probably in thickets; between 1 and 1000 m.

Remarks. 1. PRAIN considers this species as a variety of *I. staphylina* R. & SCH. The differences between this variety and the typical *I. staphylina* are, however, so important that I feel quite justified in giving it the rank of a species. In *I. staphylina* the leaf blades are thin, ovate to ovate-oblong, the number of lateral nerves amounts to 7—8(—11) on each side of the midrib; the corolla is broadly funnel-shaped to campanulate, and c. 2 cm long, the filaments are inserted c. 2.5 mm above the corolla base. In *I. sumatrana* the leaf blade is thicker, and always ovate, there are 11—14 lateral nerves, the corolla is much narrower and longer, tubular to funnel-shaped and c. 3—3.5 cm long; the filaments are inserted c. 1.5 mm above the corolla base.

2. The specimen from Soembawa collected by Mrs. RENSCH is somewhat aberrant. It has the stems densely warty with minute warts, the peduncles are thinner than in the other specimens and few-flowered.

38. Ipomoea aculeata BL., Bijdr. (1825) p. 715; HALL. f. in Bull. Herb. Boiss. V (1897) p. 380; id. in Meded. Rijksherb. Leiden 1 (1911) p. 25.

A glabrous twiner, to 10—15 m high (BACKER, KOORDERS), occasionally prostrate. Stems woody, greyish or pale straw-coloured, often thickened at the nodes, terete or striate to angular, glabrous, smooth or muricated by small curved hooks. Leaves petiolate; petiole slender, 2.5—8(—12) cm long, smooth or sometimes with some acute warts; blade ovate to orbicular, entire or rarely 3-lobed (see remarks), acuminate at the apex with a short or long and narrow acute or obtusish mucronulate acumen, cordate to truncate at the base, if cordate with a narrow to very broad, mostly obtuse sinus; auricles rounded; length of blade 5—14 cm, width 3—10 cm; lateral nerves 5—6 on each side of the midrib. Inflorescences axillary, 1- or few-flowered; peduncle short or very short, 2—10(—15) mm long, much thicker than the petiole; pedicels terete or angular and more or less thickened towards the calyx, 7—15 mm long, in fruit clavate and to 20 mm long, recurved in flower bud, later erect, finally recurved again; sepals 12—18 mm long, broad-elliptic or orbicular, rarely narrower, coriaceous, the inner ones mostly somewhat shorter than the outer ones and with a narrow scarious margin, all broadly rounded to emarginate at the apex and minutely mucronate, slightly enlarged in fruit and to 20 mm long; corolla white, greenish outside, expanding at night, 14—17 cm long, hypocrateriform with long and narrow tube; stamens and style exserted; filaments inserted at the mouth of the tube, unequal, filiform, hairy at their base; anthers lanceolate, sagittate, c. 5 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular; disk low, annular; capsule enclosed by the sepals, ovoid, mucronate, c. 15 mm high, 4-valved, with more or less lacerate valves, 2-celled, 4-seeded; seeds densely grey-woolly, 6—8 mm long.

SUMATRA, East Coast, N. W. Karolands, GALOENGI 464, July 1919 (B).

JAVA, W. Java, without locality, KUHL & VAN HASSELT s. n. (L, mixed with *I. alba* L.); Batavia, G. Parang, BLUME 1234 (L, *type of I. aculeata* BL.; U); id., BLUME 684 (L); Buitenzorg, Balekambang, Zandbaai, BACKER 25609, Aug. 1918 (B); Djapara-Rembang, Ngarengan, KOORDERS 35604 β, May 1899 (B); Soerabaja, forest-district N. Soerabaja, Bloeloek, on marl, BEUMÉE 2683, May 1918, a very small specimen (B); Malang, forest Sempol near Djenggolo, KOORDERS 23464 β, June 1896 (B); Besoeki, between Rogodjampi and Bakal, ZOLLINGER 1772, May 1858 (L).

WETAR, near lake Tihoe, *Eucalyptus*-forest, ELBERT 4554, Febr. 1910 (L); hills near lake Tihoe, *Eucalyptus*-forest, ELBERT 4589, Febr. 1910 (L.).

Distribution: Sumatra, Java, Lesser Sunda Islands.

Habitat: In thickets and thin forests; between 1 and 700 m.

Vernacular names: waren tan tan (Karobatak, GALOENGI); klorak (Jav., Djapara-Rembang, KOORDERS).

Use: According to GALOENGI the pulverized top of the plant is used in the Karolands, Sumatra, as a medicine against boils.

Remarks. From a note by HALLIER in Bull. Herb. Boiss. V (1897) p. 380, no. 19 and in Meded. Rijksherb. Leiden 1 (1911) p. 25, n. 77 we learn that this author identifies *Calonyction mollissimum* ZOLL. with *Ipomoea aculeata* BL. This is not quite correct. The type of *I. aculeata* BL. in Leiden is entirely glabrous, whereas *C. mollissimum* ZOLL. has been based, according to the description, on specimens with a soft pubescence on stems and leaves. This soft pubescence is also found in the specimen ZOLLINGER 2860 (Buitenzorg), mentioned in ZOLLINGER's Systematisches Verzeichnis under *Calonyction mollissimum*. In correspondance with HALLIER's later opinion, which appears from several identifications on the labels in the Rijksherbarium at Leiden, the present author distinguishes the more or less pubescent specimens which group themselves round ZOLLINGER's *Calonyction mollissimum* as a var. *mollissima* of *Ipomoea aculeata* BL.:

var. **mollissima** (Zoll.) Hall. f. inedit. — *Calonyction mollissimum* Zoll., Syst. Verz. 2. Heft (1854) p. 128, 131; Miq., Fl. Ned. Ind. II (1857) p. 597 — *Calonyction mollissimum* Zoll. var. *glabrior* Miq., Fl. Ned. Ind. II (1857) p. 597 — ? *Ipomoea Yomae* Kurz, For. Fl. Brit. Burma II (1877) p. 218 (see remarks); Prain in Journ. As. Soc. Bengal LXIII (1894) p. 103 — *I. mollissimum* (Zoll.) Hall. f. ex Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512; Koorders, Exk. fl. Java III (1912) p. 121; Heyne, Nutt. Pl., ed. 2 (1927) p. 1304 — *I. mollissimum* (Zoll.) Hall. f. var. *glabrior* (Miq.) Boerl., Handl. Fl. Ned. Ind. II (1899) p. 512.

Differs from the typical *I. aculeata* in being wholly or partly pubescent or short-tomentose.

Java, Magelang, N. E. foot of Soembing, above Temanggoeng, Lörzing 400, May 1912 (B); Soerakarta, Horsfield (L; U, *type of Calonyction mollissimum* Zoll. var. *glabrior* Miq.); Kediri, near Gadoengan, Koorders 22861 β, May 1896 (B, L); Besoeki, near Waringin, Zollinger 671, *type of Calonyction mollissimum* Zoll. (according to Zollinger); Litjin, Zollinger 2860, May 1845 (B); Madoera, Teysmann 1780 HB (B, L); Pegantenan, Vorderman 82 (B); Kangean Islands, Paliat, Backer 29618, May 1919 (B).

Lombok, Rindjani, S. E. side, Sapit valley, S. slope of Poessoek mountain, Elbert 1891, June 1909 (L); id. between Sapit and Swela, Elbert 1939, June 1909 (L).

Soembawa, Batoe Doelang, Mrs. Rensch 603, May 1927 (B); Wawa, Mrs. Rensch 889, June 1927 (B).

Timor, without locality, Reinwardt 1277, see remarks (L); S. Middle Timor, Kot Olien, on limestone, Mrs. Walsh 250, Apr. 1929, see remarks (B).

Alor, Kalabahi, Mrs. Bouman-Houtman 133 (B).

Philippine Islands, Luzon, Laguna prov., Calauan, McGregor, Bur. of Sc. 12397, Nov.—Dec. 1910 (B, L).

Distribution: Java, Lesser Sunda Islands, Philippine Islands (perhaps in Silhet, Pegu and Tenasserim, see remarks).

Habitat: In thickets and thin forests; between 1 and 700 m.

Vernacular names: oeloek-oeloek (Java, Kediri, Koorders); rabet kalorak (Madoera, Heyne, Koorders); klorak (Madoera, Vorderman).

Use: According to Heyne the leaves are used as a purgative and as a substitute for soap.

Remarks. 1. A nocturnal bloomer; the flowers are open only during a single night; they are fragrant, giving an odour being a cross between that of clove and of sirih-leaves (Lörzing). The wood of the stems is fragrant (Backer).

2. The leaf margins are generally entire; the specimen Walsh 250

from Timor has the leaves partly entire and partly three-lobed. Such three-lobed leaves are also found in a specimen from Timor collected by REINWARDT (n. 1277).

3. It is not quite certain that *I. Yomae* KURZ of which species I did not see the type, really belongs here. HALLIER mentions it as a synonym of *I. aculeata* after having examined the materials in the Kew herbarium (Meded. Rijksherb. Leiden 1, 1911, p. 25). As KURZ describes his species with pubescent petioles, appressed pilose lower surfaces of the leaves and pubescent peduncles, it might be better to consider it provisionally as identic with var. *mollissima*. The specimen of KURZ was collected in the forests of the Pegu Yomah Mts. PRAIN mentions specimens from Silhet and Tenasserim.

4. MIQUEL's var. *glabrior* of *Calonyction mollissimum* ZOLL. is based on a specimen (HORSFIELD) which is less dense pubescent than the typical specimens of ZOLLINGER. As only point of difference MIQUEL mentions the sinus of the leaves being obtuse ("foliorum sinus obtusus") instead of acute as should be found in the typical *C. mollissimum*. In the specimens I could examine of *I. aculeata* as well as of var. *mollissima* the sinus is mostly distinctly obtuse.

39. **Ipomoea tuba** (SCHLECHTEND.) DON, Gen. Syst. IV (1838) p. 271 — *Convolvulus grandiflorus* JACQ., Hort. Vindob. III (1776) p. 39, t. 69; DESR. in LAMK., Encycl. Meth. III (1789) p. 543, non L. f., 1781 — *C. tuba* SCHLECHTEND. in Linnaea VI (1831) p. 735 — *Calonyction grandiflorum* (JACQ.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 442, in note; id. in DC., Prodr. IX (1845) p. 346 — *Ipomoea glaberrima* BOJ. ex BOUTON in HOOK., Journ. Bot. I (1834) p. 357; HALL. f. in VALETON, Pl. Pap. in Bull. Dép. Agric. Ind. Néerl. X (1907) p. 50; DOCTERS VAN LEEUWEN in Ann. Jard. Bot. Buitenz. XLVI—XLVII (1936) p. 405 — *Convolvulus catharticus* BLANCO, Fl. Filip. ed. 1 (1837) p. 94 (according to MERRILL in Bur. Gov. Lab. Philipp. 27 (1905) p. 63; id., Spec. Blanc. (1918) p. 321) — ? *Calonyction comosperma* BOJ., Hort. Maur. (1837) p. 228 — *C. Jacquinii* DON, Gen. Syst. IV (1838) p. 267 — *Ipomoea grandiflora* (CHOISY) HALL. f. in ENGL., Bot. Jahrb. XVIII (1893) p. 153, non ROXB., nec LAMK. (see remarks); BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512.

A glabrous twiner. Stems woody, branched, terete or angular, smooth or rarely muricated, straw-coloured in dry specimens, often longitudinally wrinkled. Leaves petiolate; petiole 3.5—16 cm long; blade orbicular or ovate, acuminate at the apex with obtuse, mucronulate top, deeply cordate at the base, auricles rounded; length of blade 5—16 cm, width of blade 5—14 cm; lateral nerves 7—8 on each side of the midrib, secondary nerves parallel, tertiary nervation distinctly reticulate (at least in dry specimens the secondary and tertiary nervation often pellucid). Inflorescences axillary; peduncles short, terete, pale, 1—few-flowered, variable in length, 0.7—7(—12) cm; pedicels angular, thickened in fruit (to clavate), 14—30 mm long; flowers opening at night. Sepals orbicular, with broadly rounded to emarginate, mucronulate apex, equal in length or the interior ones slightly longer, the exterior ones 15—20 mm long, the interior 18—25 mm, all coriaceous, the interior ones somewhat thinner; corolla white, with 5 greenish bands, hypocrateriform, 9—12 cm long, the cylindrical tube 7—8 cm long, the expanded limb c. 8—10 cm in diam.; stamens and style included; filaments inserted near the base of the corolla tube, c. 6 mm above the corolla base, filiform, glabrous, except at the dilated base; anthers linear, c. 6 mm long, short-sagittate at the base; ovary glabrous; style filiform, glabrous; stigma biglobular; capsule globular, 2—2.5 cm high, pale brown, glabrous, opening by 4 valves, 2-celled, 4-seeded; seeds 10 mm long, black, densely short-tomentose and with longer (to c. 3 mm) sericeous hairs along the edges; sepals enlarged in fruit, at first enclosing the capsule as a cup, later reflexed against the pedicel, 20—30 mm long; pedicels much thickened in fruit.

MALAY PENINSULA, Perlis, Pulau Rabana, off coast of Perlis, on trees and limestone rocks by sea. HENDERSON, Singapore Field n. 23112, Nov. 1929 (B).

SUMATRA, Atjeh and Dependencies, P. Wé, Sabang, in *Barringtonia*-formation, VAN STEENIS 9, Dec. 1927 (B); Simaloer, ACHMAD 964, March 1919 (B, L); East Coast, P. Berhala, VAN DER MEER MOHR 32, 88, Aug. 1926 and Aug. 1927 (B); Tapanoeli, Batoe Islands, P. Pinil, RAAP 517, Oct. 1896 (B); Lampong Districts, Krakatau, BACKER 33971, Apr. 1906 (B); Lang Island, BACKER 33970, May 1908 (B); Verlaten Island, N.E. side, DOCTERS VAN LEEUWEN 3738, Apr. 1919 (herb. D. v. L.).

JAVA, without locality, BLUME s. n. (L); Batavia, Duizend eilanden (Thousand Islands), Noordwachter, BOSCHMA 68, Sept. 1921 (B); id., VAN SLOOTEN & BACKER 35044, Sept. 1921 (B); P. Pendjaliran, Noordoostereiland, SMITH 104, Dec. 1906 (B); P. Paniki, Zuidwachter, SMITH 38, Dec. 1906 (B); P. Bokor, Klein Kombuis, BACKER 31061, Nov. 1920 (B); island Edam, BACKER 34059, Apr. 1906 (B); island Haarlem, VAN STEENIS 6806, Apr. 1935 (B); island Leiden, BOERLAGE s. n., July 1888 (L); id., DOCTERS VAN LEEUWEN 7873, Apr. 1924 (B); Tandjong Priok, KUHL & VAN HASSELT 80, Apr. (L); coast, in *Barringtonia*-form., VAN HARREVELD s.n. (Pa); id., thickets along canal, HALLIER s.n., June 1896 (B); Tjilintjing, E. of Tandjong Priok, SCHEFFER s.n., Aug. 1871 (B); Antjol, BACKER s.n. and 34058, May 1903 (B); Buitenzorg, cult. in the Botanic Garden, XV. K. B. 9; XV. K. B. X. 6; XV. K. B. XIV. 11 (B); Pelaboean Ratoe, KUHL & VAN HASSELT 211, Febr. (L); Besoeki, bay of Bonde alit, ALTMANN 491, Apr. 1935 (B); Madoera, Kangean Islands, Kangean, Kajoe Waroe, BACKER 28051, Apr. 1919 (B); id., Bangko, BACKER 29189, Apr. 1919 (B); id., Mamboerit, BACKER 27358, March 1919 (B); id., Saboenten, BACKER 29785, May 1919 (B); id., Saèboes, BACKER 29111, Apr. 1919 (B); id., Saoebi, BACKER 28376, Apr. 1919 (B); id., Saoebi, MAHLMEISTER 25, March 1919 (B); id., Sapapan, BACKER 28474, Apr. 1919 (B); id., Saseël, BACKER 28689, Apr. 1919 (B); id., Sepandjang, BACKER 28791, Apr. 1919 (B).

CELEBES, Celebes and Dependencies, P. Moena, on limestone, KJELLBERG 54, Febr. 1929 (B); Manado, Miangas (Palmas) Island (according to MERRILL, 1923).

MOLUCCAS, Ternate, Tagalolo, BEGUIN 1655, June 1921, see remarks (B); Ambon, Hila, TREUB s. n. (B).

NEW GUINEA, Netherlands New Guinea, Schouten Islands, Biak, N. coast, FEUILLETAU DE BRUIJN 274, Aug. 1915 (B); Merauke, KOCH s. n. and T. T. 3, Aug. 1904 (B, L); Territory of New Guinea, Finschhafen (SCHUMANN & HOLLRUNG); Papua, Port Moresby, CARR 11867 & 11868, Apr. 1935 (L).

BISMARCK ARCHIPELAGO, Duke of York (N. Lauenburg) group (SCHUMANN & HOLLRUNG).

PHILIPPINE ISLANDS, in thickets often near the sea (MERRILL). Luzon, Batangas prov., Taal Volcano, MERRILL, Spec. Blanc. 1051, Jan. 1917 (B, L); also in Jolo (MERRILL).

Distribution: Tropical America, East tropical Africa, Mascarene Islands, tropical Asia, Polynesia.

Habitat: On the beach and in thickets near the sea; between 0 and 10 m.

Vernacular names: alor baoewo alas (Sumatra, Simaloer, ACHMAD); tatampajan besar (Java, Batavia, SCHEFFER); gangamielke (Netherlands New Guinea, KOCH); lambatung (Philippines, Súlu language, MERRILL); bulacan (Philippines, Tagálog language, MERRILL).

Remarks. 1. Several authors¹) have interpreted this species as being identic with *Ipomoea grandiflora* (L. f.) LAMK., Tabl. Encycl. I (1791) p. 467 (= *Convolvulus grandiflorus* L. f., Suppl. (1781) p. 136). On account of the description of *Convolvulus grandiflorus* L. f. it is evident that the specimen of KÖNIG, which has been described by LINNAEUS, the son, as the type, belongs to another species. LINNAEUS, the son, describes the stems and petioles as pubescent, a characteristic never found in *I. tuba.* According to HALLIER (in Jahrb. Hamb. Wiss. Anst. XV

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¹) CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 198; FORBES, Wander., Germ. ed. II (1886) p. 222; SCHUM. & HOLLR., Fl. Kais. Wilh. Land (1889) p. 115; WARB. in ENGL., Bot. Jahrb. XIII (1891) p. 413; TRIMEN, Handb. Fl. Ceyl. III (1895) p. 214; MANSON BAILEY, Queensl. Fl. IV (1901) p. 1060; BAKER & RENDLE in THIS.-DYER, Fl. Trop. Afr. IV, 2 (1905) p. 190; KOORDERS, Exk. fl. Java III (1912) p. 121.

(1898) p. 45; id. in Meded. Rijksherb. Leiden 1 (1911) p. 25) *Convolvulus grandiflorus* L. f. is identic with *Stictocardia tiliaefolia*[1]).

2. MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 369 mentions this species as *Calonyction album* (L.) HOUSE. For a discussion of this combination made by HOUSE, see HALLIER in Meded. Rijksherb. Leiden 1 (1911) p. 25, n. 76.

3. The specimen BEGUIN 1655, from Ternate, has aberrant seeds; they are long hairy at the margins and otherwise glabrous.

40. Ipomoea trichosperma BL., Bijdr. (1825) p. 710; CLARKE in HOOK., Fl. Brit. Ind. IV (1883) p. 198 (see remarks); HALL. f. in Bull. Herb. Boiss. V (1897) p. 379; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512; HALL. f. in Bull. Herb. Boiss. sér. 2, I (1901) p. 675; KOORDERS, Exk. fl. Java III (1912) p. 120 — *Calonyction trichospermum* (BL.) CHOISY in Mém. Soc. Phys. Genève VI (1833) p. 442; id. in DC., Prodr. IX (1845) p. 346; HASSK., Pl. Jav. Rar. (1848) p. 523; ZOLL., Syst. Verz. 2. Heft (1854) p. 128; MIQ., Fl. Ned. Ind. II (1857) p. 598; GAGNEP. & COURCH. in LEC., Fl. Indo-Chine IV (1915) p. 287 (?, see remarks) — *Ipomoea capillata* SPANOGHE in Linnaea XV (1841) p. 340; FORBES, Wander., Germ. ed. II (1886) p. 222; BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512 — *Calonyction diversifolium* HASSK., Catal. Pl. Hort. Bogor. alt. (1844) p. 140; id. in Walp., Rept. VI (1847) p. 531; id., Pl. Jav. Rar. (1848) p. 523 — *C. trichospermum* (BL.) CHOISY var. *diversifolium* (HASSK.) CHOISY in DC., Prodr. IX (1845) p. 346; MIQ., Fl. Ned. Ind. II (1857) p. 598 — *C. capillatum* (SPANOGHE) MIQ., Fl. Ned. Ind. II (1857) p. 598 — *Ipomoea longiflora* R. BR. var. *diversifolia* (HASSK.) HALL. f. in Versl. 's Lands Pl. t. 1895 (1896) p. 130; id. in Bull. Herb. Boiss. V (1897) p. 379 (*I. longiflora* non R. BR. var. *diversifolia*) — *I. trichosperma* BL. var. *diversifolia* (HASSK.) BOERL., Handl. Fl. Ned. Ind. II (1899) p. 512.

A glabrous twiner; stems woody, terete, smooth or here and there minutely verrucose, pale brown; leaves petiolate; petiole thin, slender, 4.5—12 cm long; blade orbicular or transverse elliptic in outline, (3—)5(—7)-lobed mostly far beyond the middle, the middle lobe elliptic or lanceolate, attenuate towards both ends, acuminate at the apex with narrow, acute or obtusish, mucronulate acumen; the lateral lobes slightly smaller than the middle one, obliquely ovate to lanceolate, long-acuminate, the basal lobes much smaller; base of the leaf cordate with broadly rounded sinus; rarely the leaf margin is entire or coarsely dentate (see remarks); length and width of the blade 6—12 cm, middle lobe 5—8 × 2—3.5 cm. Inflorescences axillary; peduncles stout, nearly as thick as the stems, much thicker than the petioles, terete, smooth, 1-flowered or dichasial or partly monochasial and few-flowered; length of peduncle 2—14 cm; pedicels angular, thickened towards the calyx, 13—25 mm long; sepals very unequal, the exterior sepals much shorter than the interior ones; the first (outer) and second sepal coriaceous, broadly elliptic to orbicular, broadly rounded at the apex, mucronulate, resp. 8—10 and 10—15 mm long, the third, fourth and fifth sepal coriaceous with scarious margin, the third broad-elliptic to orbicular, broadly rounded at the apex, mucronulate, c. 16—18 mm long, the fourth and fifth broadly elliptic, rounded and mucronulate at the apex, the central part coriaceous, the margins scarious, c. 20—25 mm long; corolla white with reddish midpetaline bands, hypercrateriform with long and narrow tube, the whole corolla (tube and limb) 11—14 cm long, the tube 8—9 cm long, the limb c. 10 cm in diam.; stamens and style exserted; filaments inserted c. 1.5 cm above the corolla base; filaments long, filiform, hairy at the base; anthers linear, curved (always?), c. 5 mm long; ovary glabrous; style filiform, glabrous; stigma biglobular; disk low, annular. Capsule large, 2.5—3 cm high; seeds 7—8 mm long, densely tomentose and with long (10—12 mm) sericeous patent hairs.

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[1] The synonym Munda-Valli RHEEDE mentioned by LINNAEUS fil. does not belong here, but has reference to *Ipomoea alba* L. (*I. bona-nox* L.).

Java, without locality, Zollinger s. n. (U); Buitenzorg[1]), Buitenzorg, cult. in the Botanic Garden, coll. unknown, n. 130 (L); id., Korthals 254 (L); id., X. F. 57 (from Celebes), leaves coarsely dentate, see remarks (B, L); id., Hallier C9a, C9c, C9d, C9e, May—June 1893—95 (L); Pekalongan, Soebah, Koorders 36841 β, June 1899 (B); Soerakarta, Horsfield s. n. (L, U); Malang, Pasoeroean, near Experiment Station, Altmann 236, May 1933 (B); Bangil, Backer 7605, May 1913 (B, Pa); Binor, Backer 13058, Apr. 1914 (B); Paiton, Backer 12946, Apr. 1914 (B); G. Semongkrong, E. of Pasoeroean, Backer 37194, June 1926 (Pa); Besoeki, Batoe oelo near Sabrang, Zollinger 2727 (according to Zollinger); G. Idjen, N. slope, above Bajeman, Backer 30793, Apr. 1920 (B); Madoera, Poeloe Poeteran, N. side, Backer 20810, March 1915, leaves entire, see remarks (B).

Celebes, Celebes and Dependencies, Salajar Islands, Kajoe adi, Docters van Leeuwen 1308, May 1913 (B); P. Boeton, Limbo, Elbert 2788, 6623, 6624, 6625, Aug. 1909 (L). According to the label a specimen cultivated in the Botanic Garden at Buitenzorg under n. X. F. 57, has been originally collected in Celebes (B; specimens in L collected by Hallier, C9a, May 1893; Hallier C9c, d, May—June 1895).

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[1]) Blume describes the type locality as "in convallibus humidis circa Buitenzorg." There is no specimen from that locality in the Rijksherbarium at Leiden.

SOEMBAWA, Bima, REINWARDT s. n. and 50 (L); Wawo, Mrs. RENSCH 897, June 1927 (B).

TIMOR, without locality (Koepang, according to MIQUEL), SPANOGHE s. n. (U); SPANOGHE 41 (B, L); id., SPANOGHE No. Icon. 70 [1] (L, *type of I. capillata* SPAN.); id., DE CASTRO 5 (B); Beloe, Atam boea, Mrs. WALSH 430, June 1929 (B).

ALOR, Kalabahi, Mrs. BOUMAN-HOUTMAN 132 (B).

Distribution: Java, Celebes, Lesser Sunda Islands.

Habitat: In thickets, hedges and thin forests, near the beach and in the interior; between 1 and 400 m.

Vernacular names: aroi wat (oewat) goeling (Sund., HASSKARL, MIQUEL); tropongan (Jav., Java, Pekalongan, KOORDERS); nachtschoone (Dutch, Alor, Mrs. BOUMAN-HOUTMAN).

Remarks. 1. The leaves of this species are usually 5-lobed, occasionally they are 3- or 6—7-lobed; more rarely entire or coarsely dentate leaves are found. Among the specimens I could examine the latter is only the case in two numbers, viz. in a specimen collected by BACKER (20810) in Madoera and in a specimen cultivated in the Botanic Garden at Buitenzorg (X. F. 57).

2. Specimens mentioned by CLARKE under the name of *I. trichosperma* probably belong to *I. aculeata* BL.

3. Specimens mentioned by GAGNEPAIN & COURCHET under the name of *Calonyction trichospermum* most probably belong to another species, according to the description given by these authors.

Mentioned for Malaysia only on the ground of a single cultivated specimen:

Ipomoea (sect. *Leiocalyx*, subsect. *Calonyction*) **campaniflora** HALL. f. in Meded. Rijksherb. 46 (1922) p. 20 — *Calonyction campanulatum* HALL. f. in Bull. Herb. Boiss. V (1897) p. 1050, t. 18, fig. 2; MERRILL, Enum. Philipp. Fl. Pl. III (1923) p. 369.

Of this species MERRILL mentions a cultivated specimen from the Philippine Islands: Luzon, prov. of Union, LETE 253. It is known as suma-ñg-nagisit (Ilóko language). The species originally occurs in Mexico and Central America. For a detailed description see HALL. f. in Bull. Herb. Boiss. l. c.

Ipomoea (sect. *Leiocalyx*, subsect. *Eu-Leiocalyx*) **dasysperma** JACQ., Eclog. I (1811—16) p. 132, t. 89; HASSK., Retzia (1855) p. 70; MIQ., Fl. Ned. Ind. II (1857) p. 617; BOERL., Handl. Fl. Ned. Ind. II (1899)

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[1] There are two plates of *I. capillata* SPAN., numbered SPANOGHE no. 70, in the collections of the Rijksherbarium at Leiden.

p. 512; KOORDERS, Exk. fl. Java III (1912) p. 118; CURTIS, Bot. Mag. CXLV (1919) t. 8788.

Formerly cultivated (according to HASSKARL) in the Botanic Garden at Buitenzorg. Vernacular name: aroy kawoijang.

Doubtful for Malaysia is:

Ipomoea repanda JACQ., Enum. Pl. Carib. (1760) p. 13; FORBES, Wander., Germ. ed. II (1886) p. 222.

FORBES, Wander., Germ. ed. II (1886) p. 222 mentions a specimen collected in Timor, Koepang, by WILES & SMITH as belonging to *Ipomoea repanda* JACQ. This specimen is unknown to me, but it is rather doubtful that the West Indian *I. repanda* occurs in Timor.

Insufficiently known species:

Ipomoea ? reflexa SPANOGHE in Linnaea XV (1841) p. 341; CHOISY in DC., Prodr. IX (1845) p. 389; MIQ., Fl. Ned. Ind. II (1857) p. 619.

The original description of this species reads:

Caule volubili verrucoso, foliis cordatis ovatis acuminatis, mucrone brevi aristatis, glabris integerrimis, parallelo-venosis. Pedicellis axillaribus folio paulo longioribus, multifloris. Basi pedunculis 1-bracteatis, bracteis coriaceis. Laciniis calycinis ovato-lanceolatis, 2 exterior. brevioribus. Corolla flava valde reflexa non plicata, filamenta basi lato-appendiculata. Stigma 2-fidum, ovarium 4-ovulatum. — Crescit in insula Rotty, circa Termanoe.

There is no specimen of this species in the herbaria which I could examine.

Species mentioned for Malaysia on the ground of wrongly identified specimens:

Ipomoea quinata R. BR. The type of this species is unknown to me. A specimen from Kaiser Wilhelmsland, HELLWIG 189 [1]), in Buitenzorg (a duplicate from Berlin) belongs to the genus *Merremia* and is closely related to *M. quinquefolia*, differs, however, in the absence of glands in the inflorescences.

The specimens LOHER 2143 (4143) & 2144 (4144) from the Philippine Islands, Luzon, Benguet prov., mentioned by MERRILL (Enum. Philipp. Fl. Pl. III (1923) p. 367) are unknown to me.

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[1]) This specimen was collected Aug. 12, 1888. I suppose it is the same as that mentioned by WARBURG (in ENGL., Bot. Jahrb. XVIII (1893) p. 207) and by SCHUMANN & LAUTERBACH (Fl. Deutsch. Schutzgeb. (1901) p. 517) as HELLWIG 184, from Kelana, Kaiser Wilhelmsland, collected Aug. 12, 1888.

Ipomoea aspera VATKE (= *Calonyction asperum* CHOISY). The statement by HALLIER (in ENGL., Bot. Jahrb. XVIII (1893) p. 154; see also BOERLAGE, Handl. Fl. Ned. Ind. II (1899) p. 512) of this species as occurring in Sumatra is wrong. According to a note in HALLIER's manuscript in the Rijksherbarium at Leiden, the specimen in question belongs to the Menispermaceae (cf. HALLIER in ENGL., Bot. Jahrb. XXVIII (1899) p. 52).

Bibliographical Note.

Dr. C. A. Backer and Dr. O. Posthumus, *Varenflora voor Java. Overzicht der op Java voorkomende varens en varenachtigen, hare verspreiding, oekologie en toepassingen.* Uitgave van (Fern flora for Java. Conspectus of the ferns and fern allies occurring in Java, their distribution, ecology and use. Issued by) 's Lands Plantentuin, Buitenzorg, June 1939. I—XLVII, 1—370, 1 Plate, 1 map and 81 text figures. — *f* 7.50.

The users both at home and abroad of Dr. Backer's florae have always regretted that, however carefully these books have been prepared, most of them were imperfect in one way or another. They were either restricted to certain vegetations (weedflorae for tea and sugar-cane) or did not cover all groups of vascular plants; the "Flora van Batavia" (1907), the "Schoolflora voor Java" (1911) contain only the Dicotyledoneae-Dialypetalae, the "Handboek voor de flora van Java" (1928) contains scattered families of the Ferns and Fern Allies, Gymnosperms and many Monocotyledons. This phenomenon is probably due to the fact that Backer is a most accurate and painstaking worker, who is inclined to refrain from publication unless he is reasonably sure to be correct; and we all know how difficult it is to reach a mental state of this description. However, Backer has for some years been engaged in preparing with untiring and admirable energy, a new and complete "Schoolflora voor Java", the manuscript of which is rapidly growing to maturity. When the Pteridophytes were completed as far as the regions up to 3300′ were concerned, Dr. Posthumus suggested a collaboration in order to make a complete flora of vascular cryptogams. This collaboration of our keenest connoisseur of the Java flora and our best pteridologist resulted in the book, which we have the pleasure to announce and recommend here. Together with the new "Schoolflora" to which we may be looking forward soon, it will form the first reliable flora of the vascular plants of Java. Although the Dutch language is probably less unapproachable than the Russian one, with which Soviet botanists try to convince the world that everybody should know Russian (or that it is not necessary that other peoples should know Russian botany?), it is, I think, to be regretted that our mother tongue has been chosen for a book which many foreign botanists, notably in British Malaya and British Borneo, may desire to use. This is the more so, as the book does not only contain keys to the determination and descriptions of the 15 families, 104 genera and 515 species, but also interesting chapters on the distribution (with map), the ecology, the sociology and the use of the plants described. Also the introductory paragraphs (pp. XIII—XXX) contain many valuable and interesting notes on the morphology; the wording of these chapters is probably not easy for those who are only little familiar with our language, as Backer has a certain predilection for a literary style.

The figures are very good, the text (of course) reliable and well-balanced, as it was my privilege to state on several occasions, in which I had to use the book. Synonyms are only mentioned, as far as they refer to Java specimens. For all species data on the habitats and the distribution are added to the descriptions, which are mostly short but highly effective and to the point. They are worked up in the keys. The map shows the duration of the dry season in various parts of the island, an important feature towards the distribution of several species.

It would have been better perhaps, if a thinner sort of paper had been chosen, and possibly also a smaller size, so as to make the use in the field possible. The cover is, unfortunately, too heavy for the binding: a flexible cover would have been more suitable.

H. J. LAM.

INDEX 1)

to Vol. III

compiled by

JOSÉPHINE TH. KOSTER

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